JUNE, 1955

Traffic Engineering

Traffic on Chicago's Outer Drive — *United Press Photo*

- **Off-Street Parking for Pittsburgh**
- **The Problems of Traffic Engineering on State and Federal Routes in Urban Areas**
- **A New Technique for Progressive Timing of Traffic Signals**
- **Road User Behaviour in Relation to Road Conditions**

Official Publication of the Institute of Traffic Engineers

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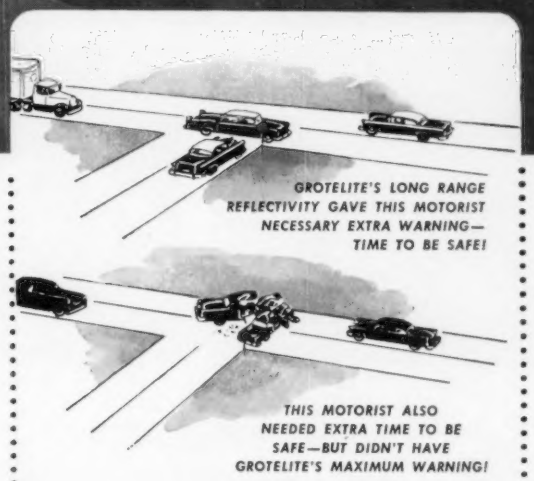
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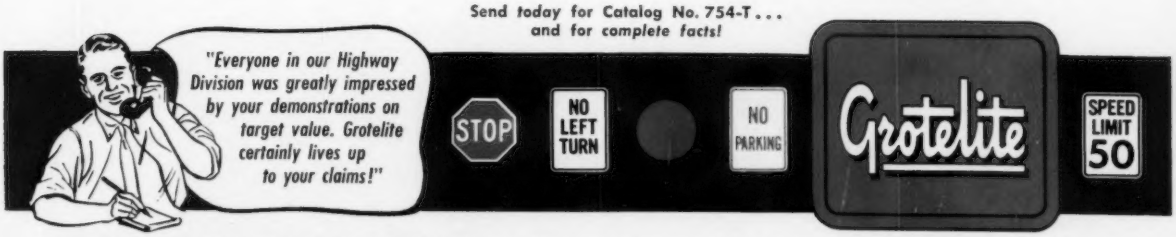
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COVER: Lake Shore Drive, also known as the Outer Drive, in Chicago showing northbound traffic during the evening rush hour last December. This picture was taken from the North Avenue overpass at a time when approximately 12,000 vehicles per hour were moving at an average speed of 30-40 mph. The roadway in the center is the main Outer Drive, with six lanes northbound and two lanes southbound. The four lanes entering from the left are La Salle Drive, a main connection between northbound traffic from the Central Business District and the Outer Drive.

DEFINITION: Traffic Engineering is that phase of engineering which deals with the planning and geometric design of streets, highways, and abutting lands, and with traffic operation thereon, as their use is related to the safe, convenient, and economic transportation of persons and goods.

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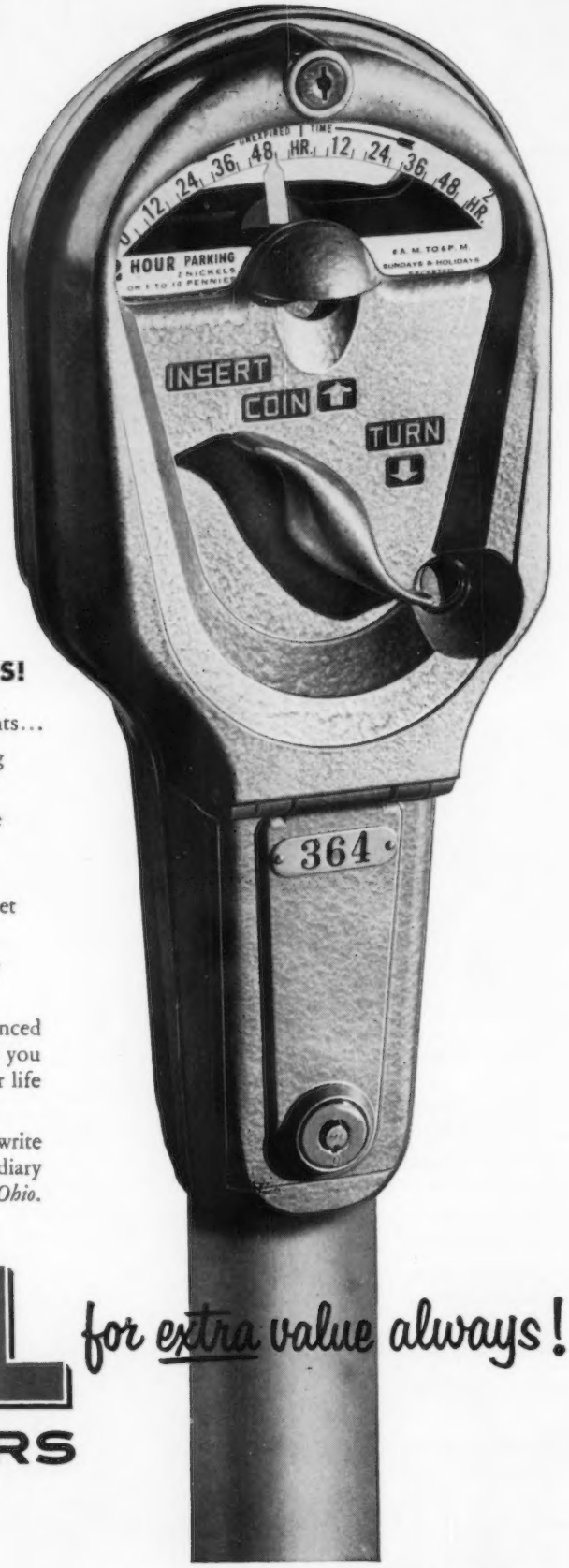

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Frankly Speaking

THE PROFESSIONAL RATING accorded the traffic engineer is based on the assumption that the traffic engineer himself carries out his responsibilities in a professional manner. He should be careful, therefore, that his writings and statements are not such that they may be open to question as to whether or not the professional approach has been used.

Some planners have been making the statement that the problem in large cities is that of moving people and goods; placing people in the same category as goods; speaking of them in that vein and ignoring completely the desires of the people. Some traffic engineers are making similar statements. We are also hearing such catch phrases as "ease that squeeze", coined by advocates of mass transit. We also read considerably about the present traffic "mess". We are also being told that congestion can be eased by removing all of the curb parking in our downtown areas so that traffic and transit vehicles may move freely. This latter idea is really designed to discourage use of the private automobile, and to force more persons to depend upon transit.

It is generally recognized by traffic engineers that mass transit is a necessity, and it is generally agreed that the greater use of transit helps to reduce congestion and other traffic ills. It should also be noted that the public has continued to express a growing preference for the private automobile as the principal means of transportation. It would, therefore, seem that the primary assignment of the traffic egineer is . . . to develop existing traffic facilities fully, and to design new ones to the best of his ability to the point where they can handle the demand safely and adequately.

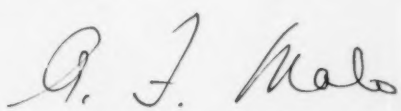
It certainly requires no professional training to urge people to make greater use of transit as the means of solving the traffic problem. But the assumption that this easy solution is the real answer is most unrealistic in view of the expressed and growing public preference for the private automobile over mass transit. Traffic engineers are not engaged for the purpose of determining the means of transportation which the American people shall use; they are retained for the purpose of planning and developing facilities which will answer the desires of the public. While they should provide public transit with adequate facilities for efficient operation, their primary responsibility is the development of a traffic system which will move all vehicles safely and expeditiously. Carefully planned improvements made to facilitate the movement of traffic over important arteries not only move private vehicles faster but move transit vehicles faster as well.

A major improvement on an important traffic artery in the City of Detroit promoted better movement of all traffic, and resulted in motor buses attaining an average speed of better than 14 miles per hour. Not only did present riders get better service but there was also a 22% increase in patronage on the line. This improvement was not made to favor any particular group, but to expedite the movement of traffic over the street and resulted in moving people faster in the vehicle of their choice.

A traffic "mess" as the expression is now sometimes used, is often the result of inadequate facilities. However, sometimes it is the result of poor traffic control. It may result from inadequate control of parking either by the traffic engineer or the enforcement agency; poor signing; poor signalization; improper timing of signals; lack of proper turning regulations, or it can be due to the lack of professional ability of the person or department charged with the responsibility for traffic control. The trouble may arise from a lack of funds to do the job, a lack of authority of the traffic engineer or from the lack of cooperation of other department or elected city officials. But whatever the particular problem and whatever its causes, the traffic engineer should recognize that it has a specific answer. Rejecting the quick and easy solution he should find it and apply it.

The matter of regulating curb parking is another area in which the traffic engineer may take the easy way out and fail to approach the problem in a professional manner. It requires no specialized training in traffic management and control to institute blanket prohibitions against curb parking. The professionally trained engineer determines first of all when and where curb parking obstructs the free movement of traffic—at those times and those places he bans this practice; at other times and other locations where curb parking does not create an obstruction to traffic movement the traffc engineer may permit it. We are not aiding the movement of traffic if we ban parking at those times and those places where it does not obstruct traffic. We are merely making it more difficult for the public to stop and carry on business or make purchases and we are not speeding the movement of people in transit vehicles by removing this parking.

In his daily operation, the traffic engineer is subjected to criticism, pressures, advice, and in some cases abuse. To succumb to these forces and to adopt measures because of them is to take the easy way out; to accept the challenge these problems offer and apply measures based on objective study, specialized training and ingenuity is to merit the professional rating which has been given.



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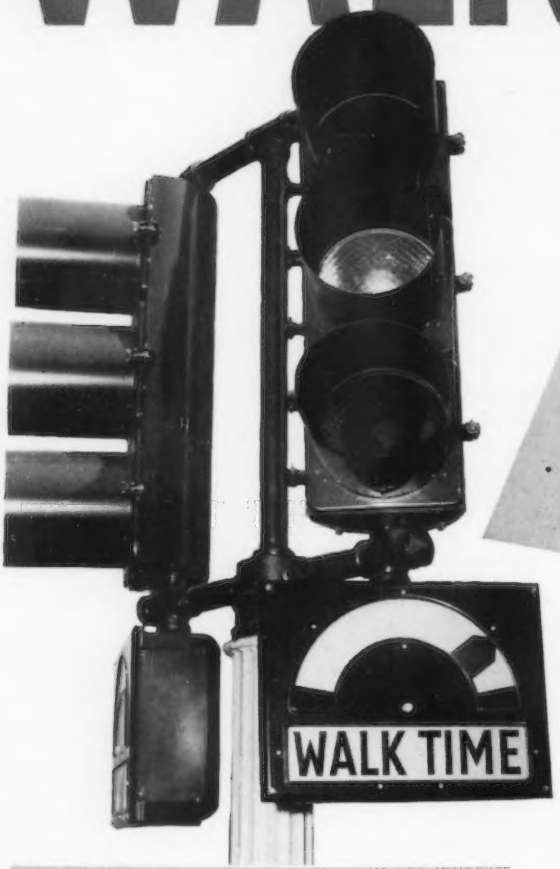

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Off-Street Parking For Pittsburgh

By William R. B. Froehlich (Assoc. Mem., ITE)

Executive Director, Public Parking Authority of Pittsburgh, Pennsylvania

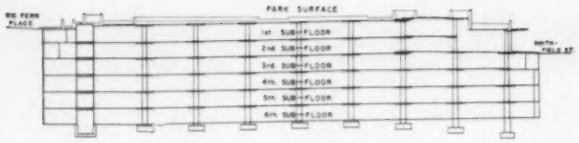
In 1945 there was no public parking agency in Pittsburgh. That year, the Pittsburgh Regional Planning Association, a private citizens' planning agency, conducted a comprehensive parking survey for the Allegheny Conference on Community Development. This survey not only determined parking demand for the downtown area, but also recommended that a Public Parking Authority be established, which was accomplished in 1947, through state enabling legislation. In 1945 there were 12,900 off-street parking spaces in downtown Pittsburgh. Today there are 15,600, with completion of two more garages this year adding 1,392 spaces.

The Pittsburgh Parking Authority is governed by a five-man, non-paid board. It finances construction of facilities primarily through revenue bond issues as authorized by State enabling legislation. For the first few years Authority expenditures incident to getting underway were covered by a loan of $200,000 from the City of Pittsburgh. Now, the loan has been repaid and the Authority operations are being conducted on a self sustaining basis.

The first parking facilities of the Public Parking Authority of Pittsburgh have been in operation since 1952. Now, with three garages in operation, two more under construction, and one more in the planning stage, it appears that some conclusions may be drawn as to the success of the program—both from financial and traffic engineering viewpoints.

Fig. 1
Third Avenue Garage — Constructed through first Authority bond issue. Capacity is 736 cars, attendant parked. Cantilevering of floor beyond outside columns gives clean horizontal lines of bumper walls.

Fig. 2
Mellon Square Garage and Park — From corner of William Penn Place and Sixth Avenue looking down Sixth Avenue. Note extra lane along Sixth Avenue for right turn movement. Photograph taken in May when Park was under construction.



SECTION – PARALLEL TO OLIVER AVE.

Fig. 3

First Bond Issue

The Authority's first bond issue of $6,000,000 was sold in 1951. This covered acquisition and construction of two open-deck ramp type garages, one of which is shown in Figure 1. In order to get a debt service coverage ratio sufficient

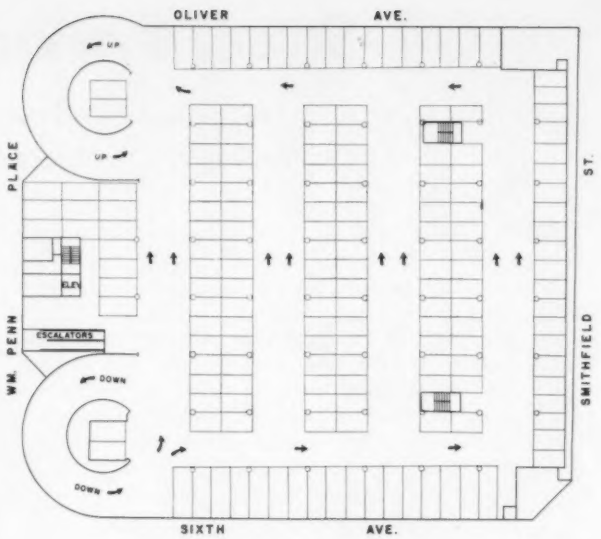
Fig. 4

Mellon Square Garage and Park — Looking up Sixth Avenue. Lower access to garage is entrance only, to second and third floors. Upper access is entrance and exit to first floor.

to sell the bond issue, it was necessary to pledge two-thirds of the revenues from street parking meters. These parking meter revenues were turned over by the City to the Authority as a loan to be repaid, at the latest, after the bonds were retired. After two and one-half years of operation, necessary reserves are built up and the bonds are being retired at a steady rate, slightly ahead of schedule. An amount equivalent to the pledged parking meter revenues will begin to flow over as surplus, thus putting the garages completely on a self-sustaining basis. Turnover of transient parkers, on a Monday through Saturday basis, averages 2.5 at each of the two garages.

Mellon Square

The most unique facility which has resulted from the Parking Authority mechanism is Mellon Square Garage, a six-level underground garage beneath Mellon Square Park in the heart of downtown Pittsburgh. The garage-park combination had been proposed for several years, but a plan of action was not set in motion until 1952 when three Pittsburgh foundations gave $4,000,000 to the City to acquire the built-up land and to construct a park. The City leased subsurface rights to the Parking Authority, and the Parking Authority, in turn, sub-leased the area to Morrison-Knudsen Company and the H. K. Ferguson Company, who agreed to design a facility for the Authority's approval, to construct the parking facility at their own expense, and to operate the facility for a period of 38 years. After several revisions, a



TYPICAL SUB-FLOOR PLAN

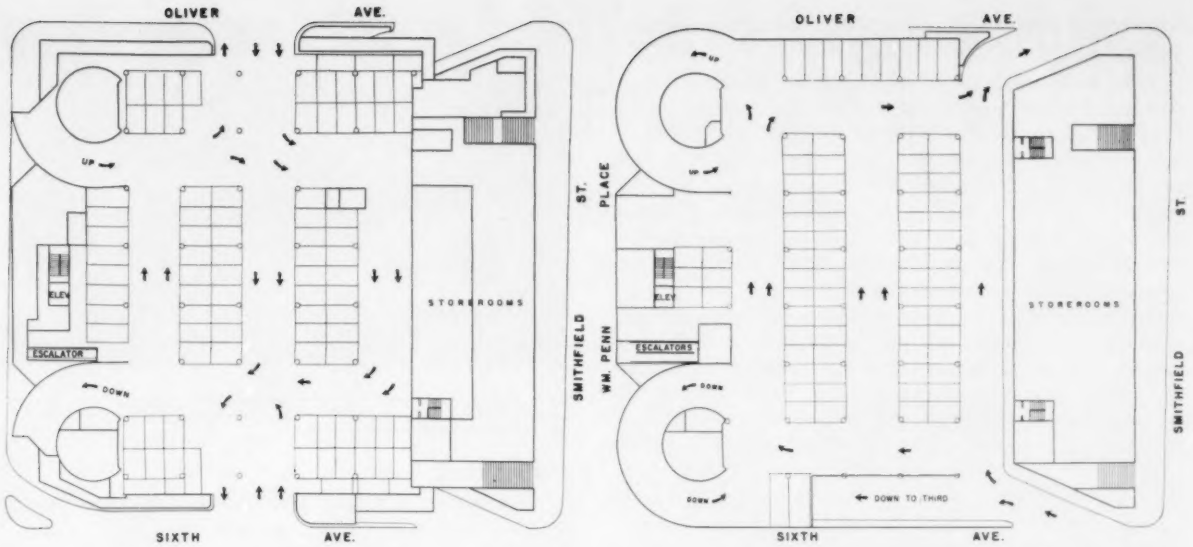
Fig. 5

plan was approved and construction got underway in September, 1953. In January, 1955, three floors of the garage were opened for partial operation. In the following months additional floors were made available until the garage was completely opened in May, 1955. From the standpoint of use and acceptance the first few months of operation have been outstanding. By March the turnover was averaging two times per day, an indication that the public had accepted garage self-parking, something new for Pittsburgh.

Parking capacity is 894 stalls, with stall widths averaging eight feet four inches. Three floors may be reached directly from the street or via a straight ramp. Two circular one-way ramps carry traffic between the first and sixth floors. Parkers, both men and women, have experienced no difficulty in driving the eighteen feet wide circular ramps. An escalator, passenger elevator, and three stairways provide adequate pedestrian access to the parking floors. Spot checks have shown that 25% of the drivers using the garage are women. Spot interviews of these women drivers reveal that they have no hesitancy in driving the circular ramps.

The Mellon Square self-parking operation is a "decentralized" one. Persons entering the garage drive to one of the parking floors as directed by arrows mounted on movable cones. Upon reaching the parking level, they are given a ticket by an attendant and directed to a parking stall. Columns of each floor at Mellon Square Garage are painted a different color and tickets and elevator and escalator stops are keyed to that color so that the parker will not have any doubt as to his parking floor. When returning to claim his car, the parker goes directly to the floor where he parked, drives his car to the outgoing ramp at that floor, and pays the attendant the parking fee. Then he is free to drive up and out of the garage. In this type of operation, one cashier is required for each floor.

From a traffic engineering viewpoint the operational advantage of self-parking has been readily apparent in Mellon Square Garage. At no time has there ever been a delay in getting off the street and entering the garage at one of the three entrances. The fact that motorists drive directly to the floor on which they park eliminates the necessity for



Figs. 6 & 7
First and second sub-floor plans of Mellon Square Garage, showing entrances and exits on Oliver Avenue and Sixth Avenue. Comparatively little reservoir space is needed at the entrances because motorists drive directly to the floor on which they park.

incoming reservoir space at the entrance point. The interior ramps are arranged so that they permit flexibility in outgoing movements. In moving up and out of the garage, if motorists find that the second floor exit to Oliver Avenue has a backlog of cars waiting to leave, they may continue up to the first floor and exit onto Sixth Avenue. The three exits distribute outgoing traffic so well that delays have been negligible. Spot checks have been made several times during the outgoing peak and during the evening peak hours of traffic. On the average, for a one-half hour period, of 127 cars driving out of the garage, only four have been delayed in any way, with the maximum delay amounting to 75 seconds. Although these spot checks were made when 760 of the 890 spaces were in use, it appears to be clear that outgoing delays will not present a problem.

Sixth Avenue, one of the streets at which traffic exits, sometimes becomes clogged during the evening peak hour. To keep traffic flowing out of the garage, an extra lane has been added to Sixth Avenue for part of the block so that outgoing parkers may drive to the next perpendicular street, William Penn Place, to avoid the congested Sixth Avenue. This is illustrated in Figure 2.

Another feature of the garage-park design of interest to traffic engineers is that automobile and pedestrian conflicts at the garage entrance and exit points have been eliminated. The sidewalks of Oliver and Sixth Avenues have been taken from street level and moved into the park above. Thus, persons walking along the sidewalk will not be subjected to the usual hazards prevailing at garage sidewalk entrances. Before the design was approved, it was realized that pedestrians moving up Oliver and Sixth Avenues on the park side of the street would be inconvenienced through being required to climb steps to the park level. However, pedestrian counts showed that the park sides of these streets were less favored than the other sides. Therefore, it is believed that the inconvenience caused to some pedestrians will be greatly outweighed by the elimination of vehicular-pedestrian conflict and improved traffic flow.

Fig. 8
Mellon Square Garage and Park — Looking up Sixth Avenue from Smithfield Street. Lower access point is exit only from second floor. Upper access point is entrance and exit to first floor.

Second Bond Issue

The second revenue bond issue was sold in October, 1954. This $5,750,000 issue covered acquisition and con-

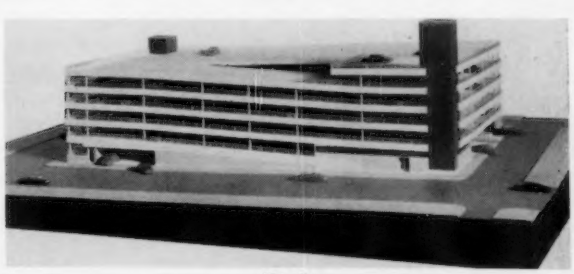


Fig. 9
Allies Garage — Model of 528-car self-parking garage fronting on Boulevard of the Allies. Sloping floor construction eliminates separate ramps. Architect — Hoffman and Crumpton. Planning Consultant — Ramp Buildings Corporation.

struction of two garages which would be operated as self-parking facilities, accommodating 1,392 cars.

One garage located at the Boulevard of the Allies at Smithfield Street, named the Allies Garage, is a six-level sloping floor facility similar to the G. Fox Garage in Hartford whose operation was described in the March 1955 issue of TRAFFIC ENGINEERING. In addition to reducing overhead costs, it is expected that the self-parking feature will eliminate delay often encountered in attendant parking garages at high turnover locations. Upon driving into the garage, Mr. Parker will have a numbered ticket placed in his windshield and will be given a correspondingly numbered stub by an attendant. He will be directed to drive to a specific level where he himself will park the car as directed and guided by another attendant at that level. Then he will take an elevator to the ground floor and proceed to his destination. Upon returning to the garage to claim his car, Mr. Parker will go to a central cashier's office where he will pay the parking fee and will receive a release check. Then he will take an elevator to the level where his car is parked and drive to an exit where an attendant will pick up the claim check, signifying that he has paid his parking fee. This method of self-parking operation might be termed "centralized control."

Because the garage in effect is one continuous floor—a sloping sandwich of parking lots—considerable attention had to be given to the problem of floor numbering so that garage customers will be confused as little as possible. Each floor will have a different color of columns, and stalls will be numbered so that a customer can more readily find his car. In order to reduce the walking distance to parked cars, floor numbers will be coordinated with elevator stops with the layout planned in such a way that no person will be required to walk up or down more than one-half level.

The second garage financed by this bond issue, the Diamond Street Garage, is located in the block bounded by Smithfield Street, Fourth Avenue, Cherry Way and Diamond Street. This is a seven-level structure with two one-way circular ramps. The garage is planned either for attendant parking or self-parking, but because of the acceptance of the Mellon Garage self-parking operation, it will be operated as a self-parking facility. Capacity under self-parking will be 864 spaces.

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0-½	$ .25	8.5		$ .25	5.9
½-1	.35	22.2		.35	18.8
1-2	.50	47.2		.50	40.9
2-3	.65	64.1	58.	.65	56.7
3-4	.80	75.7		.80	67.2
4-5	1.00	84.2		1.00	75.5
5-6	1.20	89.1		1.10	80.1
6-7	1.40	92.2		1.20	84.0
7-8	1.60	94.2		1.20	87.4
8-9	1.80	95.5		1.20	92.0
9-10	2.00	97.1		1.40	94.2
10-24	2.20-2.50	98.2		1.60-2.00	97.6
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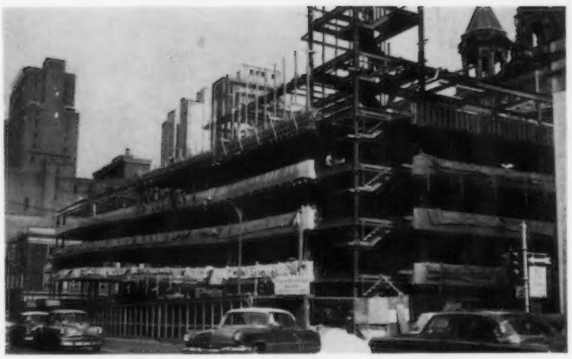

Fig. 10

Allies Garage, as of May 3rd, is to be completed early in July. Revised building code permits structural steel construction with fireproofed interior columns and concrete slab.

Parking Rates

The Parking Authority Law dictates that the Authority must exclusively determine the rates that are charged at its facilities. Because of this feature of the law, special study must be given to the parking rate structure. Since the Parking Authority must be a *public* agency as well as a *financially sound* corporation, equal emphasis must be given to the equity of parking rates as well as the income to be produced by those rates.

One example of this rate study is shown in Table I. The Boulevard Garage was one of the first two garages erected by the Authority. When the garage was opened, it was known from the 1945 Parking Study that 58% of the parkers in the tributary area of the garage desired to park three hours or less (column 4). However, it was not known, exactly, what rate would appeal to the short time parker and, at the same time, attract the longer time parker to the extent shown in the study. As a trial, the rate shown in column 2 was established. After several months, as shown in column 3, it became apparent that, although the rate *did* appeal to the short time parker, it was penalizing too severely those persons who wished to park longer times and was driving them away. So, the rate beyond the fifth hour was reduced as shown by column 5, bringing the cumulative percentage (column 6) in line with the demand shown by the Study. Garage usage, as well as total income, increased with the change in rate. The number of customers parking three hours or less was not affected. In fact, as the months passed and the number of cars handled increased, the parkers in the "three hours or less" bracket increased proportionately.

(Continued on page 356)

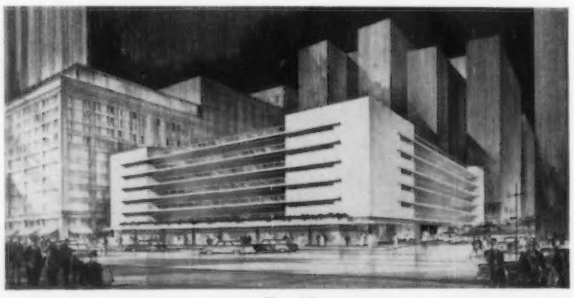

Fig. 11

Diamond Street Garage. Now under construction, to be completed in November. Capacity will be 864 spaces, self-parking. Shops will front on Smithfield Street, a street with good commercial values. Policy of Authority has been to continue commercial frontage where possible so that a "dead" block will not be created. Architects — Hoffman and Crumpton. Planning Consultant — Ramp Buildings Corporation.

The Problems of Traffic Engineering on State and Federal Routes in Urban Areas

By Gordon Gravelle (Mem., ITE)
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Washington, D. C.

(NOTE: *This paper was presented at the Southern Safety Conference in New Orleans, Louisiana, on February 28, 1955.* —EDITOR.)

STATE AND FEDERAL routes are often the main source of traffic difficulties in urban areas. An obvious reason, of course, is that they usually carry the heaviest volumes of movement. We know that today our city street systems are handling—or trying to handle—half of the nation's motor vehicle travel, though they comprise only one-tenth of the total highway mileage. A large part of this disproportionate share of the traffic is crammed onto state and Federal urban routes.

To keep traffic moving freely and safely under these conditions poses a formidable challenge to traffic engineering. Nor is the task made any easier by the fact that year after year, record-breaking increases in vehicles continue to pour onto street systems which for the most part were sadly outdated even before World War II. But apart from major physical deficiencies, there is another factor that hampers effective operational improvements on many state and Federal routes. Too often the traffic engineering problems on these routes result from treating symptoms rather than causes.

A basic cause of much of the traffic muddle on state and Federal urban routes is conflict between through-traffic and access-traffic. To bring this point into focus, let us consider the three fundamental purposes the street system is expected to serve. They are:

1. To provide access to abutting property.
2. To permit circulation within a given area.
3. To facilitate movement from one area to another and through the city.

When a street predominantly serves one of these basic purposes, certain distinct characteristics are observable in the traffic accommodated.

For example, where the primary function is to serve abutting property, people and goods are constantly seeking access to residences, stores, warehouses and other buildings. Parking for vehicles at rest is a vital consideration. Frequent stops and turning movements are made to reach access points. Traffic as a rule moves slowly.

On streets where the chief function is circulation within an area, the need for stops and turns to reach homes, places of business, etc., is appreciably less; parking requirements are relatively fewer; and the speed of movement is markedly stepped up.

On streets principally devoted to through-traffic from one area to another or through the city, there are few stops and turns for local access; there is little desire to park; and speed of movement and trip time become of paramount importance.

Fig. 1
"—vehicles continue to pour into street systems—sadly outdated—"

Now it must be clear that no street can serve all three purposes equally well at the same time. There can be no real operating efficiency when traffic with all these varying characteristics is thrown together to compete for the limited street space available. The result can only be interference and confusion—and that's exactly what we are getting on many of our major thoroughfares, and on lots of minor ones too.

The most modern traffic engineering measures will not avail much so long as we persist in the impossible position of trying to make a business or shopping street serve the purpose of a through-street. Therein lies the main reason for the intolerable traffic mess found on so many of our state and Federal urban arteries.

Fig. 2
Grade separation showing two types of urban arterials.

Too few cities have taken the trouble to classify their street systems—organize them properly for purposes of operation and improvement, into systems in line with the basic functions they should be serving. A sound classification scheme is an indispensable asset to any community, since it is in effect a guide for the best possible use of the street plant.

The first requisite, then, in choosing streets for state and Federal routes, is to give careful attention to existing service and traffic characteristics. The streets selected should already be functioning largely as through-facilities, or they should be capable of conversion to this type of use. Then the resources of traffic engineering can be applied to provide a maximum of swift, safe, unimpeded movement. Curb-parking should be abolished, turning movements controlled, and other steps taken to increase capacity and eliminate delays.

Since most of our larger cities have an ample number of arterial streets, certain ones can be adapted without too much difficulty to through-service exclusively. However, many of the small cities have only one or two main streets, and these are often overrun by hordes of vehicles funneled in by state and national trunklines. These streets are badly needed to serve local access uses. All that these small communities gain from the through-vehicles is traffic paralysis, since they are not business-bringers, but are merely intent on getting through town as quickly as possible. As experience has shown, the only lasting solution in this situation is to build a bypass around the town to carry the state and Federal route traffic.

Another frequent obstacle to the development of an effective program of traffic engineering on state and Federal urban routes is lack of clear-cut policy as to authority and jurisdiction. Should the city or state have exclusive control of traffic operations on these routes through communities? If complete control is not assigned to one or the other, how much should be given to each? If authority is divided between city and state, responsibility for which phases of traffic operations shall be given to the city and state?

It is a known fact that some state highway departments are seriously handicapped in their efforts to improve traffic service on urban extensions because they do not have adequate power to do so. In a number of states, the department's authority and jurisdiction ends at the corporate limits of the municipalities. Where this holds true, it is not unusual to find obsolete and unwarranted traffic signals, unreasonably restricted speed limits and little, if any, route marking.

These conditions may be due in part to differences of opinion between city and state as to the importance of operating speeds, standardization of control devices, need for route markers and other operational measures. They may be due also to the inability of municipalities to provide modern traffic improvements; and where the state is prevented from servicing these needs, there is a stalemate.

On the other hand, some states have granted exclusive control of all traffic operations to their highway departments. The logic here is that since the department is responsible for the state system of highways, it should have authority over all segments of that system, whether they are within or without corporate limits.

This arrangement may not appeal to some states, since it usually calls for a considerable increase in traffic engineering personnel, especially where routes through large cities are involved. It may even require establishment of a metropolitan district office, because constant study is imperative, as well as close liaison with city officials. Then, too, the state traffic engineer is faced with different conditions on rural routes than on urban routes. Speeds on rural highways are greater, there are few intersections, there is not nearly as much need for signalization, and problems of signing are

completely different. In the cities, intersections are legion. The traffic jam is compounded by countless parking and turning maneuvers. The location of signs, signals and markings is vastly more complicated.

From the standpoint of the large city, too, exclusive state control presents certain handicaps. It is likely to hamper the city traffic engineer both in developing a comprehensive operational program and in making routine changes in devices and techniques.

The state, of course, is chiefly interested in maintaining a well-integrated state network of more or less uniform operating characteristics. By the same token, the city wants a completely functional street system, into which the state and Federal extensions are harmoniously coordinated. Differing viewpoints as to operational needs, therefore, are bound to arise from time to time.

Such clashes are apt to occur especially where legal authority for the traffic engineering program has been divided between state and city. Joint responsibility is seldom economical, or even workable. Since it is difficult to segregate certain functions and to eliminate overlapping of duties, frequent misunderstandings and conflicts occur. Result is confusion and delays. Some phases of traffic operations receive proper attention—others are largely neglected.

We could go on at some length discussing the pros and cons of current practice in granting authority to the state, city or both. In my opinion, however, the whole problem revolves around a few basic questions:

1. Which division of government is best qualified to determine needs on urban state routes and carry out an effective traffic improvement program?
2. What is the relative magnitude of traffic engineering needs on the state routes, as against those of the city as a whole?
3. Who generates the traffic problem on the urban extensions? In other words, it is caused mainly by local vehicles or "foreign" traffic merely passing through? In a small community, the entire problem may be concentrated on a single main street flooded with state route traffic.
4. Who has the primary interest?

On the basis of these criteria, the best approach would seem to be for the larger cities to be granted full control of traffic operations on the state and Federal routes within their borders; and for the state to assume complete responsibility for extensions within the smaller communities.

For one thing, the big cities with well organized and competent traffic engineering departments are able to conduct a better operational program than could be accomplished with limited state personnel. Again, the ratio of traffic engineering requirements on state routes is only moderate in terms of total needs for the city as a whole. A major city has many arterials besides those serving as state routes. Moreover, the proportion of local traffic using the state routes in a big city is relatively large, and hence the city has a substantial—and often primary—interest.

One condition should be imposed if the city is given full control of state routes, and it is this: In order to insure that a level of traffic service is maintained in keeping with that on rural segments of the state highway system, the city should be required to perform the functions and duties of traffic engineering in a manner which will meet the standards of service prescribed by the state.

Now as to the smaller cities, we know that few of them have qualified traffic engineering organizations. In these communities, the state routes usually preempt the only available arterial streets. Most of the traffic and the resulting traffic problems stem from through-traffic using the state highway. Assumption of full operational control by the state, therefore, would not only be meeting a clear-cut state responsibility but would be providing the smaller communities with a vital service which most of them now lack.

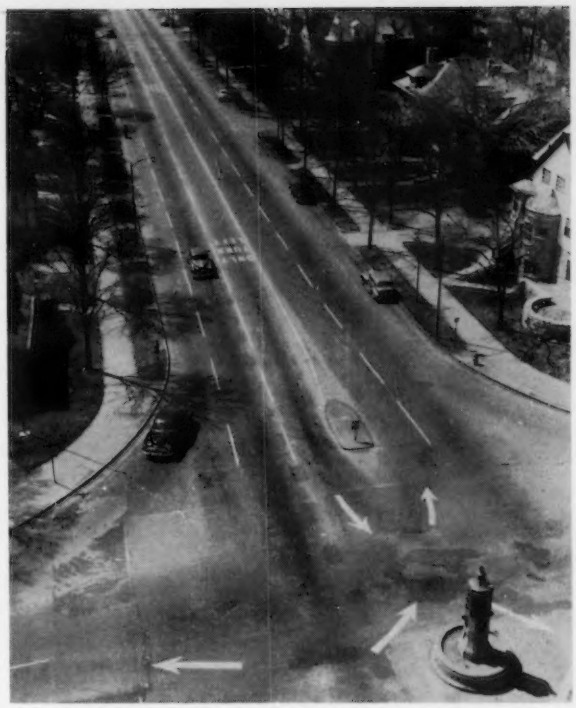

Fig. 3
Some streets can be adapted to through service without much difficulty.

Apart from the matter of jurisdiction, haphazard development of street facilities adds to the headaches of the traffic engineer. Our cities are growing; suburban expansion is proceeding at a tremendous rate. This means new streets, new parking facilities, new business and industrial structures,

Fig. 4
"Our cities are growing; suburban expansion is proceeding at a tremendous rate."

Fig. 5
"—five- and six-point intersections are extremely inefficient.—"

new schools and residences. Too often these new developments are poorly planned and controlled, thereby re-creating our traffic problems all over again.

For example, although it has been recognized for years that five- and six-point intersections are extremely inefficient and hazardous, they are still being constructed today—some of them on established state routes. Close spacing of intersections, creating frequent turning movements into and from high-volume state routes, is another evidence of inadequate planning. Why should we go on repeating the costly mistakes of the past?

It is inconceivable at this late date that we should permit construction of 200- and 300-foot intersections on state highways. Yet in effect that's what we're doing every time we allow a long paved area to be built in front of a business establishment for entrance or exit. What this amounts to is a 300-foot "T" intersection, a traffic maze inviting confusion. No engineer would design such an intersection without proper channelization to control the direction of flow.

Or take schools. Schoolhouses are being built in every new subdivision. But why do they have to be located on the heaviest traveled highway, as they commonly are. In many cases, moreover, most of the children come from an area on the opposite side of the highway in relation to the school. There is always danger for children at any street crossing. Why increase the risk unnecessarily by short-sighted planning?

This recreating of traffic problems, this piling up of new deficiencies, could be prevented if proper working relations were developed between all groups concerned. There should be consultation and a meeting of the minds at the planning stage of every new subdivision. State and city traffic engineering agencies should be in close contact every step of the way with planning commissions, zoning commissions, redevelopment boards, city and county engineers, school boards, automobile clubs, business and civic organizations.

Only through such cooperative relations is it possible to develop standards of service and facilities which will insure a high level of safety, convenience and economy in the use of our roads and streets. Only in this way can we avoid the waste of time and money that is inevitable when we try to treat symptoms instead of causes. Then, instead of attempting to remedy past mistakes that are virtually incurable without major reconstruction, traffic engineering can bring to bear all it resources to afford the public optimum transportation service on every highway, old and new.

OFF-STREET PARKING FOR PITTSBURGH *(Continued from page 352)*

It was interesting to note the effect of the 1954 mass transportation strike on garage usage. Many persons in Pittsburgh assumed that the Parking Authority and private parking operators were reaping large profits since almost everyone was required to come to work by automobile. However, for the most part, gross incomes from parking were less than before the strike. At the same Boulevard Garage, whose parking usage was analyzed in Table I, persons parking in the "all day" range (from seven to nine hours) changed from 8.0% before the strike to 15.2% during the strike. By 9:15 A.M. the garage would be filled with workers' cars, thus making it impossible to accommodate the shopper and salesman arriving later in the morning. Turnover was drastically reduced and gross revenues suffered due to the parking stagnation. Unfortunately, settlement of the strike after 45 days did not put the situation back in balance for the Pittsburgh Railways Company, because many persons who were forced into car pools by the strike were weaned away from mass transportation permanently after tasting the convenience and lower cost of riding with a car pool group. These car pool groups did not affect Parking Authority operations since, after the strike, they drifted away from the garages to lots on the downtown fringe charging a rate that was more appealing to all-day parkers.

Summary

By the end of 1955 the Public Parking Authority of Pittsburgh will have provided 3,914 off-street parking spaces in the downtown area. All three of the garages presently in operation are operating in excess of estimates, both from the standpoint of cars handled and income produced. An additional survey of the downtown area is being made to determine the future course of the Authority. At least one garage will be constructed on a lot presently owned by the Authority.

With progress being made downtown, the Authority expects to extend its operations this year into secondary business districts within the City. In two of these districts, several parking lots may be financed through a revenue bond issue. In two others, parking needs will be surveyed.

As part of a master plan of redevelopment for the Lower Hill District on the fringe of downtown, the Parking Authority will work with the Urban Redevelopment Authority to provide parking facilities for a 110-acre recreational, cultural and residential area. It is hoped that the parking facility will have a double use, serving the new recreational facilities in the evening and weekends, and serving the downtown area as fringe parking for workers during the day.

The ten years since the 1945 Parking Survey was published have been spent in organization, planning of initial steps and getting underway with initial facilities downtown. Whatever success the Parking Authority can claim is due largely to good cooperation and relationships among many official and private agencies and to careful planning and selection of sites for its first facilities. Progress has come as a result of the work of many people, working toward a common goal. Continued progress in the next ten years will require a similar unanimity of effort.

A New Technique for Progressive Timing of Traffic Signals

By Lionel M. Rodgers, E.E., P.E.

Chairman, Citizens' Committee on Traffic Control, Philadelphia, Pennsylvania

(Mr. Rodgers has been Chairman of the Citizens' Committee on Traffic Control in Philadelphia since it was formed in 1952. This advisory committee of engineers provides technical services to the Traffic Engineering Section of the Bureau of Streets in Philadelphia, on a voluntary basis, in the establishment of progressive traffic control on the City's arteries.)

WITH AN EVER INCREASING NUMBER of signalized intersections in our cities, the need for progressive operation of traffic control signals becomes more and more essential. Figure 1 shows two pictures of a typical intersection along Lincoln Drive in Philadelphia, taken under similar conditions, before and after a progression was established along that street. Each of these pictures was taken at the end of the red period at a time when the volume of traffic was about 1000 vehicles per hour. The elimination of delays and congestion by the progressive system is obvious.

The traffic engineer has two ways of setting up a progressive system. The first, commonly referred to as an interconnected system, requires an independent wire line connecting a master controller to each and every one of the other controllers in the system. Where it is desired to have the phasing of the various signals change several times a day in accordance with predetermined traffic demands, this may be the only feasible method of establishing a progression.

The second, which requires no special wire lines or extra controller equipment, depends upon each of the controllers maintaining synchronism with the power line frequency. This method relies upon the continuity of the electric service at each of the controllers and is generally called non-interconnected, though rigidly connected through the power network.

Such is the reliability of service of our electric utilities that non-interconnected progressions compare favorably in performance with interconnected systems. Non-interconnected progressions avoid one source of trouble always present with interconnection — failure of the interconnecting cable or a short circuit at one of the controllers will stall or throw out of step a large number of signals until the trouble is corrected.

For either interconnected or non-interconnected progressions, the engineering work is exactly the same. Either time-space diagrams are prepared, or some substitute method such as that devised by Garland Feaser (A Quick Solution to Progression Problems—Eagle Signal Corp., Bulletin Z-10) is used to determine the time-space relationship between the beginnings of green at the various signals to be included in the system.

When a grid of streets, such as the Germantown grid in Figure 2, is involved, a common cycle for the entire system must be selected. The problem of fitting the various progressions together in the grid to provide progression on all streets often requires patience and experimentation. Unless the street distances fit a reasonable pattern, it may be necessary to accept discontinuities on one or more of the streets. However, by adroit juggling it is often possible to avoid all or most of these discontinuities. Once this juggling is done, offsets of the intersections involved are taken from the diagrams. Where two streets having progressions cross, it is necessary to state the offset in terms of the No. 1 street on the controller.

Up to this point, it has made no difference for which type of system the instructions were being prepared. If the progression is to be of the interconnected type, offsets in

Fig. 1

No progression between signals. With progression in operation.

Intersection of Lincoln Drive and Carpenter Lane in Philadelphia before and after progression was established along Lincoln Drive. Each of the pictures was taken at the end of the red period of the signal cycle, at a time when the traffic volume was about 1000 vehicles per hour.

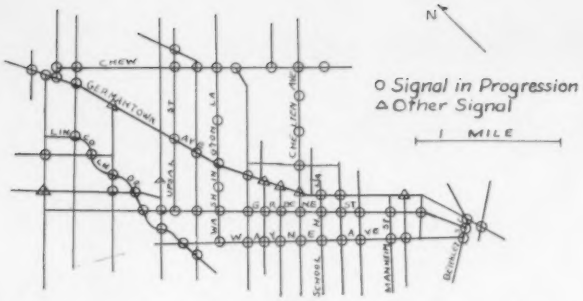

Fig. 2

The Germantown Section of Philadelphia, showing major streets and signalized intersections.

dial percentage are generally supplied for each controller to the field forces. Dial settings are easily interpreted and installed.

If, however, the progressions are to be of the non-interconnected type, signal to signal "leads" are generally supplied to the field forces, making the setup more difficult and subject to error. With the "lead" system on a two-way street, the field man must work in the prescribed direction, or have two sets of "leads", one for each direction, which further increases chances for error. The errors involved in such a method are cumulative, so that if a whole grid of streets is involved, as illustrated in Figure 2, great difficulties are encountered in maintaining any sort of accuracy of timing on the cross streets.

In the Germantown grid of Figure 2, Chew Avenue, Germantown Avenue, Greene Street, Wayne Avenue and Lincoln Drive are all major two-way arteries, crossed by a number of other important two-way streets. Between these crossings are a number of signalized minor streets. Greene Street and Wayne Avenue are in progression for a distance

% Offset	30 or 31	32 or 33	34 or 35	36 or 37	38 or 39	40 or 41	42 or 43
Sec. Offset	15	16	17	18	19	20	21
	MIN SEC	MIN SEC	MIN SEC	MIN SEC	MIN SEC	MIN SEC	MIN SEC
Factor a	0 35	0 34	0 33	0 32	0 31	0 30	0 29
Start Main Street Green - Stop Watch Reading - Seconds	0 15	0 16	0 17	0 18	0 19	0 20	0 21
	1 05	1 06	1 07	1 08	1 09	1 10	1 11
	1 55	1 56	1 57	1 58	1 59	2 00	2 01
	2 45	2 46	2 47	2 48	2 49	2 50	2 51
	3 35	3 36	3 37	3 38	3 39	3 40	3 41
	4 25	4 26	4 27	4 28	4 29	4 30	4 31
	5 15	5 16	5 17	5 18	5 19	5 20	5 21
	6 05	6 06	6 07	6 08	6 09	6 10	6 11
	6 55	6 56	6 57	6 58	6 59	7 00	7 01
	7 45	7 46	7 47	7 48	7 49	7 50	7 51
	8 35	8 36	8 37	8 38	8 39	8 40	8 41
	9 25	9 26	9 27	9 28	9 29	9 30	9 31
	10 15	10 16	10 17	10 18	10 19	10 20	10 21
	11 05	11 06	11 07	11 08	11 09	11 10	11 11
	11 55	11 56	11 57	11 58	11 59	12 00	12 01
	12 45	12 46	12 47	12 48	12 49	12 50	12 51
	13 35	13 36	13 37	13 38	13 39	13 40	13 41
	14 25	14 26	14 27	14 28	14 29	14 30	14 31
	15 15	15 16	15 17	15 18	15 19	15 20	15 21
	16 05	16 06	16 07	16 08	16 09	16 10	16 11
	16 55	16 56	16 57	16 58	16 59	17 00	17 01
	17 45	17 46	17 47	17 48	17 49	17 50	17 51
	18 35	18 36	18 37	18 38	18 39	18 40	18 41
	19 25	19 26	19 27	19 28	19 29	19 30	19 31
	20 15	20 16	20 17	20 18	20 19	20 20	20 21
	21 05	21 06	21 07	21 08	21 09	21 10	21 11
	21 55	21 56	21 57	21 58	21 59	22 00	22 01
	22 45	22 46	22 47	22 48	22 49	22 50	22 51
	23 35	23 36	23 37	23 38	23 39	23 40	23 41
	24 25	24 26	24 27	24 28	24 29	24 30	24 31
	25 15	25 16	25 17	25 18	25 19	25 20	25 21
	26 05	26 06	26 07	26 08	26 09	26 10	26 11
	26 55	26 56	26 57	26 58	26 59	27 00	27 01
	27 45	27 46	27 47	27 48	27 49	27 50	27 51
	28 35	28 36	28 37	28 38	28 39	28 40	28 41
	29 25	29 26	29 27	29 28	29 29	29 30	29 31

Fig. 3

Table 5 — Sheet 3 of "Timing Tables for the Progressive Setting of Traffic Signals." This typical page is based on a 50-second cycle and includes offsets from 30% to 43%, or 15 to 21 seconds.

of about three miles and each of the major cross streets also has a progression which is interlocked with the north-south progressions of Greene Street and Wayne Avenue. This entire grid is on a 50-second cycle.

Using the signal to signal "lead" system would have required fantastic accuracy on the part of the signal maintainer. Suppose, for example, that he started from Greene Street and Chelten Avenue on this grid and worked south, and that he had only a one-second variance in setting in each of the signals. By the time he reached Berkley Street, he could easily be out as much as six seconds. If he then worked west to Wayne Avenue and again north to Chelten Avenue, he could be as much as 14 seconds out by the time he reached that street. This would obviously introduce an intolerable error in the east-west progression on Chelten Avenue and would require a long process of rechecking and resetting in order to get all the signals approximately correct.

This trouble is never encountered with interconnected signals since all signals are timed from a single master controller which establishes a zero reference time once each cycle. Each of the secondary controllers is set, not from the adjacent controller, but from the same master. It appeared reasonable to believe that the same process could be followed in a non-interconnected system by timing each of the intersections from a selected master. This was done, but since the cycle employed was 50 seconds and since the master signal could not be seen except at a few adjacent locations, a good deal of calculating was necessary to convert cycle offset from a given point into actual time on a 60-second stop watch.

The solution first considered was to obtain a series of stop watches, one operating on a 40-second cycle, one on a 50-second cycle, one on a 70-second cycle, etc., and to have the maintenance man use the appropriate watch in accordance with the cycle employed in the area in which he was working. Investigation, however, showed that no such watches were obtainable and the development of a watch to operate on other than a 60-second cycle would be a long and expensive process.

This impasse led to the development of the timing tables which are the subject of this article. Entitled "Timing Tables for the Progressive Setting of Traffic Signals", this volume contains a section for each standard cycle from 30 to 90 seconds. The sections contain a column for each possible offset, headed in both percentage and seconds. Figure 3 shows a page from the 50-second cycle section, which includes the offset from 30 to 43% (15 to 21 seconds). Each column represents in effect the time table for a traffic signal operating on the designated cycle and offset, as read on a standard stop watch started from a zero reference point, normally the start of green at a designated intersection.

To illustrate the use of the tables, assume that a system operating on a 50-second cycle is being checked, and that the next signal has an offset of 20 seconds. Referring to Figure 3, the 20-second offset column is located. If the stop watch were started at zero cycle time from the master controller, then offset 20 comes at stop watch readings 0 min.-20 sec., 1 min.-10 sec., 2 min., 2 min.-50 sec., 3 min.-40 sec, etc. This column is thus a time table for the operation of any signal having an offset of 20 seconds. If the signal being checked goes green at any one of the times listed in this column, it is "on time".

These tables make non-interconnected progressions as easy to set up and check as interconnected progressions. They

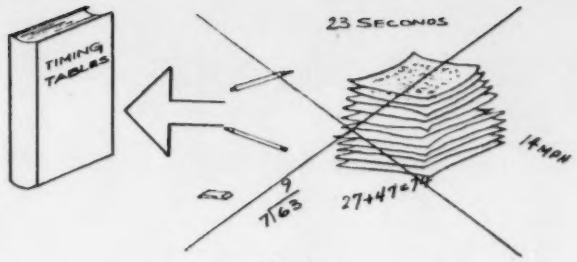

Fig. 4
The use of pencil and paper to make elaborate computations in the field is eliminated by the "Timing Tables".

provide the necessary accuracy without the electrical complications and interconnection costs of the latter system. They also have the further advantage of relieving the field man of the need for using pencil and paper in setting up a non-interconnected progression, and provide a simple and foolproof technique for checking either type of system.

To transfer the information from the time-space diagram to the field forces, simple, non-ambiguous and complete instructions are required. Figure 5 shows a typical form on which this is accomplished. The blocks at the bottom of the page tell the maintainer the location at which to start his watch, the cycle which is in effect, and the street which the sheet covers. Other information for each intersection is also given including the signal offsets, the intersection splits and the dial settings. If interconnection is in effect, the "dial settings" column includes the "reset key" setting.

Once the maintainer has set up the split, he then need only refer to the designated column of his timing tables to determine when the signal should start its green period on the street being time. Absolutely no field calculations are required on his part. Nor must the field maintainer be in sight of the previous signal or rushed to complete his work. On one important traffic artery in Philadelphia of eight signals, only two are in sight of each other. Using the "lead" method, either several men would have been required to pass signals, or the maintainer would have had to perform a considerable calculation for each signal with resultant chance of error and at a considerable cost in time. With the tables he can ride the street or any of the associated streets, stopping where required, and checking each signal instantly. Two men can easily check signals while driving at regular speed in their car. The writer alone regularly checks twenty-five intersections in fifteen or twenty minutes, and can easily check the entire grid of sixty-two signals shown in Figure 2 in an hour's time.

To further illustrate the use of these tables, assume that a field maintenance man has been given the data sheet for Greene Street, shown in Figure 5, as well as other similar data sheets for the streets in the system in Figure 2.

Referring to this data sheet, the man notes that the beginning of the green period on Greene Street at Chelten Avenue is the grid "zero". Therefore, he goes to that intersection and starts his stop watch at the beginning of the green period on Greene Street. The watch will run continuously until the job is complete, excepting as it may be necessary to restore it to zero setting by virtue of the stop watch register reaching its maximum value, as described later.

Once his stop watch is running on system time, the maintainer can do any signal or street in the grid directly.

DEPARTMENT OF STREETS
TRAFFIC ENGINEERING
PHILADELPHIA, PA.

FILE

PREPARED BY: L. M. Rodgers Oct. 1952
CHECKED BY: 195
APPROVED BY: 195

"S" MEANS SIGNALS ON INTERSECTION STREET ARE TIMED

	INTERSECTION	OFFSET SECS	NO. 1 STREET-SECS GREEN	G-A	AMBER	NO. 2 STREET OR PEDES.-SECS GREEN WALK	G-A WALK - WAIT	AMBER WAIT	NO. 3 STREET OR PEDES.-SECS GREEN WALK	G-A WALK - WAIT	AMBER WAIT	DIAL SETTING
	Berkley	15 (D)	17		3	*27		3				*0-54-60-94
	Logan	20	29		3	15		3				0-58-64-94
	Manheim	0	26		3	18		3				0-52-58-94
	Queen Lane	21	30		3	14		3				0-60-66-94
	Coulter	0 (C)	24		3	20		3				0-48-54-94
	School House	25 (B)	22		3	22		3				0-44-50-94
	Chelten	0 (A)	22		3	22		3				0-44-50-94
	Rittenhouse	22	28		3	16		3				0-56-62-94
	Harvey	48	30		3	14		3				0-60-66-94
	Walnut Lane	17	29		3	15		3				0-58-64-94
S	Washington La.	48	27		3	17		3				0-54-60-94
	Upsal	41										0-56-62-94
	Hortter	20	27		3	17		3				Actuated
	Lincoln Dr.	40	17		3	*27		3				*0-54-60-94

REVISED 6/14/54

ALL OFFSETS FROM START OF GREEN ON Greene AT Chelten

CYCLE 50 SECONDS

SHEET 1 OF 1 SHEETS
SIGNAL TIMING FOR:
Greene St.
(NO. 1 STREET)

Fig. 5
Typical data sheet for use in setting up and checking signal timing on a progressive system.

Suppose, for example, that he elects to work directly south. The next street is School House Lane with an offset of 25 seconds. (Marked "B" on Figure 5.) By the time he gets out of his truck, checks the controller and is ready to put this intersection "in step" with the timer stopped at the beginning of Greene Street green, the time by his watch may be 5 minutes 30 seconds. Referring to the 25-second offset column of the 50-second cycle section of the tables, see Figure 6, he finds that the next start of green on Greene Street should be 6 min.-15 sec., and the following one 7 min.-5 sec. All he then needs to do is wait until his watch reaches 6 min.-15 sec. and turn on the timer motor switch. He can check his work by waiting to see that when the next green period begins, his stop watch reading coincides with the next table interval, 7 min.-5 sec.

% Offset	r 49	50 or 51	52 or 5
Sec. Offset	4	25	26
	SEC	MIN SEC	MIN SEC
Factor a	26	0 25	0 24
	54	0 25	0 26
	44	1 15	1 16
	04	2 05	2 06
	4	2 55	2 56
	4	3 45	3 46
	34	4 35	4 36
	24	5 25	5 26
	14	6 15	6 16
	04	7 05	7 06
	54	7 55	7 56
	44	8 45	8 46
	34	9 35	9 36

Fig. 6
Portion of Table 5 — Sheet 4, showing part of the 25-second offset column for a 50-second cycle.

Going on to the next signal—Coulter Street—he finds the offset given as 0 (marked "C" on Figure 5), and repeats the process using the entries in the "0" offset column, Figure 7. He then proceeds from signal to signal until he reaches Berkley Street. The maintainer can now start up Wayne Avenue, one block from Greene Street, following the exact same procedure. Like all other offsets in the grid, the Wayne Avenue offsets are taken from the start of the green period on Greene Street at Chelten Avenue, and the Wayne Avenue data sheet used by the maintenance man so designates.

Let us suppose that the maintainer's watch reads 27 min.-10 sec., when he reaches Berkley Street, on the way south on Greene Street. Both the tables and the register of stan-

(Continued on page 365)

Road User Behaviour in Relation to Road Conditions

By R. J. Smeed, Ph.D.

Road Research Laboratory, Department of Scientific and Industrial Research, Great Britain

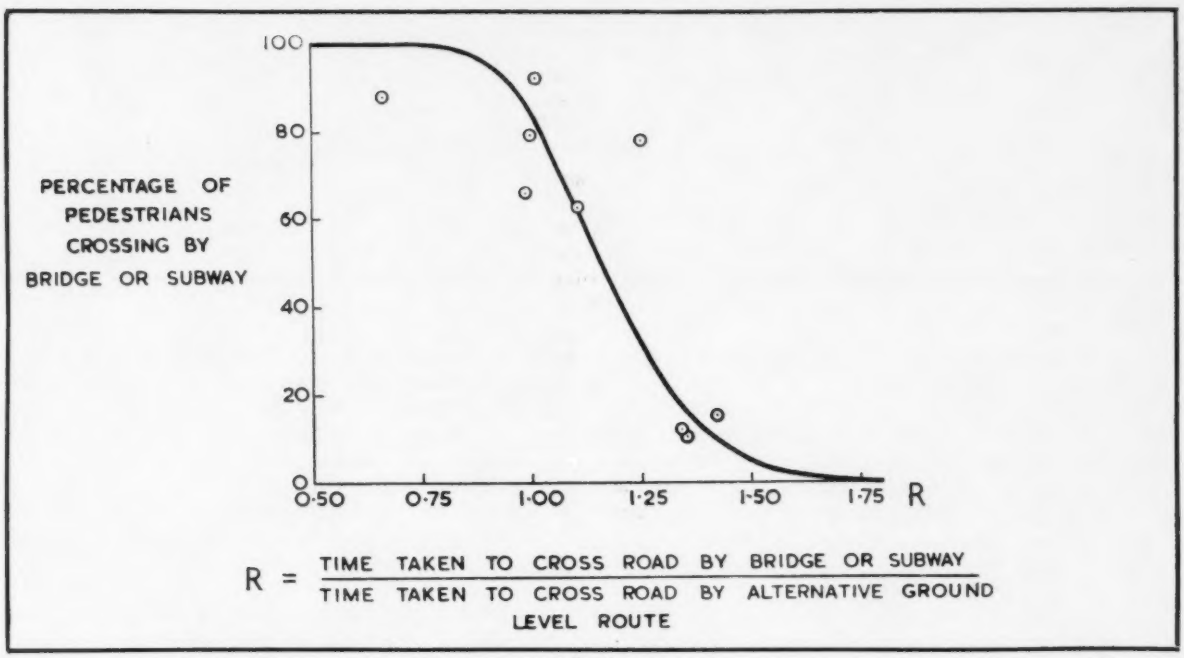

Fig. 1

This paper, presented to the First International Course in Traffic Engineering held at the Hague in June 1953, appeared in the Winter 1954 (Volume 2, No. 1) issue of the International Road Safety and Traffic Review, published quarterly in English and French, by the World Touring and Automobile Organization of London.—EDITOR.

THE SUBJECT of "Road user behaviour in relation to road conditions" covers a very wide field. Not a great deal is known about it, although much is guessed. Until more is known, traffic engineers, who of course have to make their decisions in the light of current knowledge and opinion, will have to make use of the guesses as well as of the definite knowledge. In this paper a review is made of the attempts in various countries to obtain knowledge.

There are, however, two points to be mentioned. The first is that although, as already stated, not a great deal is known in relation to what must be learned about the subject, much more is known than can possibly be covered in a short paper. Secondly, complete knowledge of any one part of the subject is not yet available and, as a consequence, this review will be somewhat scrappy. Perhaps, however, the mere pointing out of the gaps will assist in filling them in due course.

The first subject to be considered in this paper is the way in which pedestrian behaviour is affected by some road conditions and this will be followed by a consideration of driver behaviour.

Effect on Pedestrian Behavior

One of the things a traffic engineer wishes to know is the conditions under which a pedestrian will use any special facilities which are supplied for him. An investigation on the subject has been carried out at the Road Research Laboratory, England. Counts were made of the numbers of pedestrians who used some subways and pedestrian bridges and of the numbers of pedestrians who did not use these facilities. The times taken to cross the road by the surface route and by the subway or overhead bridge were also measured.

The results are given in Fig. 1, in which the percentage of pedestrians who crossed the road by the bridge or subway is plotted against the ratio of the times taken to cross the road by the two routes. It will be seen that in those cases in which the time taken to cross the road by the bridge or subway was about the same as that taken by the surface route, a high proportion of pedestrians used the special facilities provided for them. In those cases, however, in which it took as little as 30 percent more time to cross by the bridge or

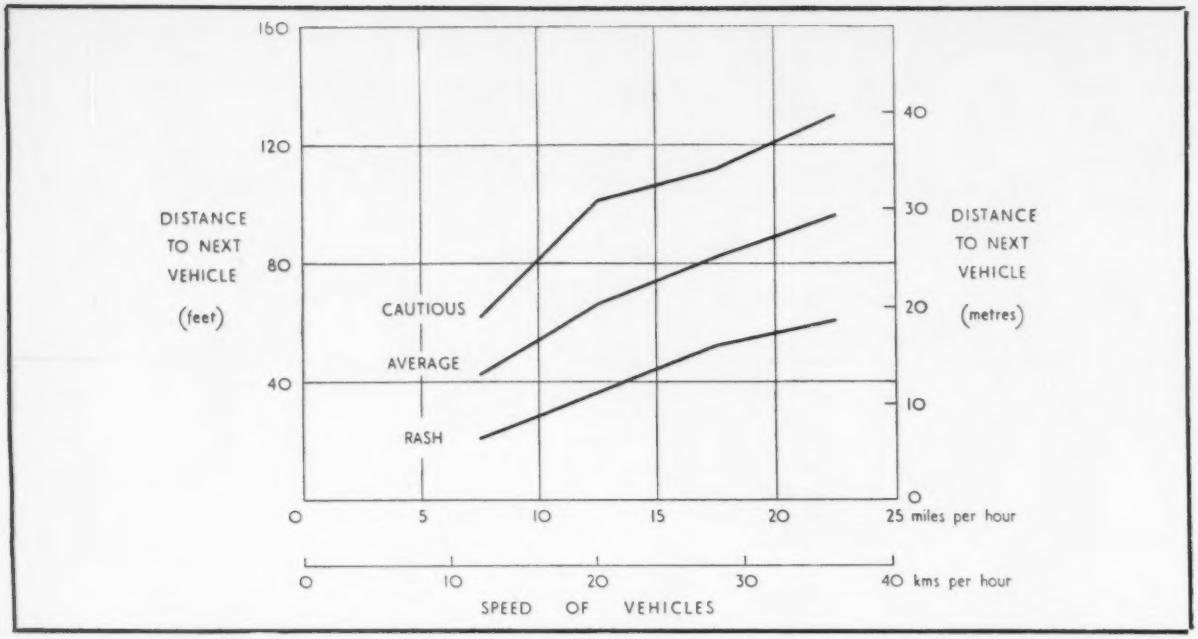

Fig. 2

subway, fewer than 20 percent of pedestrians used the special facilities provided for them.

It appears to follow that if traffic engineers wish to encourage pedestrians to use such facilities they should try and reduce the extra time taken to cross by the special facility as much as possible, and to increase as much as possible the time taken to cross the road by the surface route. The latter method has been used very successfully at Osterley on the Great West Road near London, by placing a long barrier on the center island of the dual carriageway.

Traffic engineers need to know how road users behave under different traffic conditions. The Road Research Laboratory designed an investigation to discover some of the things affecting the decision of a pedestrian as to whether or not it is safe for him to cross the road. It is well known that pedestrians do pay some regard to oncoming traffic, but some observations have been made as to exactly how much attention they do pay. Fig. 2 gives distances, for vehicles approaching at various speeds, at which pedestrians were willing to cross a road at a pedestrian crossing with a refuge in Slough, England. The observed pedestrians have been divided into four groups in ascending order of cautiousness as measured by the distances from oncoming vehicles at which they were prepared to cross the road. The pedestrians have been labelled at boundary lines between the groups (1) rash, (2) average, and (3) cautious, and it is obvious that the pedestrians pay considerable regard to the oncoming traffic. The faster the approaching vehicle, the greater the distance away

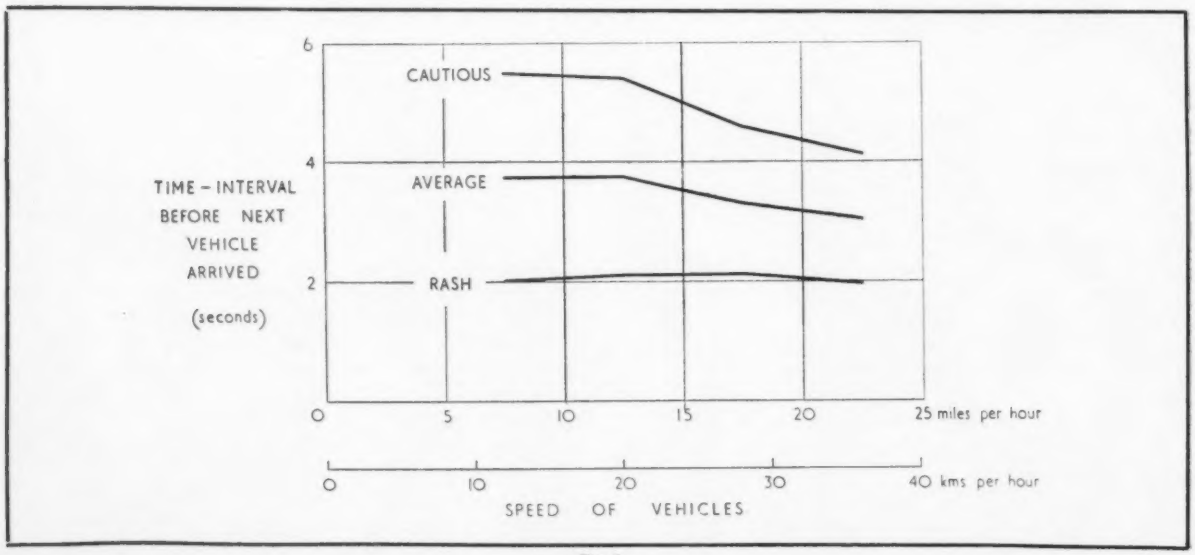

Fig. 3

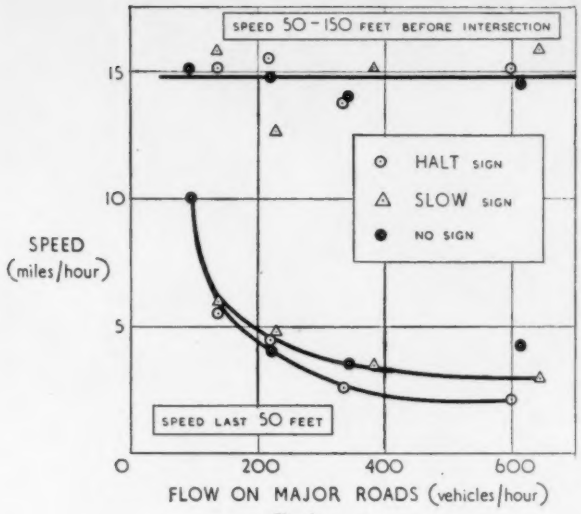

Fig. 4
Speeds on minor road.

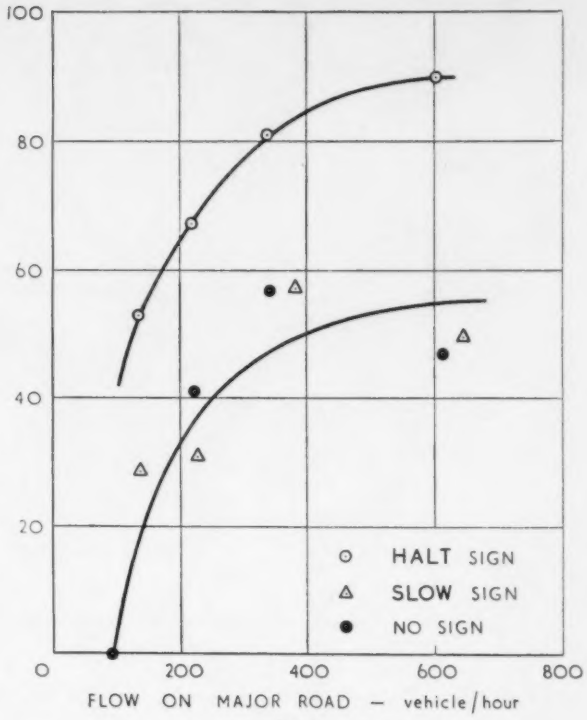

Fig. 5
Percentage of drivers who stopped when entering a major road.

it has to be before the pedestrian starts to walk across the road in front of it. It will be seen that the average pedestrian was willing to start to cross the road when a vehicle approaching at 7½ miles, or 12 km. per hour was 42 feet, or 13 metres, away from him, but was only prepared to cross the road when a vehicle approaching at 15 miles, or 24 km. per hour was 74 feet, or 23 metres, away. It follows therefore that if a pedestrian is prepared to walk across the road at a given distance in front of a vehicle approaching at a certain speed, he allows nearly double the distance for a vehicle approaching at double the speed.

Perhaps this result is shown more clearly in Fig. 3, where the time interval between the moment a pedestrian steps off the carriageway and the arrival of the vehicle, assuming it travels at constant speed, is plotted against the speed of the vehicle. It will be seen that the time interval that the pedestrian allows before crossing the road in front of oncoming vehicles is not very dependent on the speed of oncoming vehicles. Also the pedestrian is quite a good judge of the speed of oncoming traffic. It is clear, however, that the average pedestrian underestimates slightly the speed of the faster vehicles or assumes that they will slow down. It is interesting to note, however, that the rash pedestrian does not apparently underestimate the higher speeds.

The Effect of Road Surface Conditions

Some ways in which road conditions affect driver behaviour will now be considered, and the first of them is the effect of road surface condition. It is, of course, to be expected that the condition of the surface of the road would affect the behaviour of traffic and this has been investigated as far as wetness is concerned, on some roads in Central London. It was found that on a road which looked and was slippery when wet, the average speed of traffic went down by about 20 percent under wet coditions. The distribution of traffic across the road also became more even. This road was a wood block surface and it is known that wet weather results in a marked increase in accidents on such surfaces.

It is seen therefore that although drivers take more care by driving more slowly on slippery roads, they still have more accidents. Observations of traffic under wet and dry conditions were also made on two roads in London which were not particularly slippery when wet. Little difference was found between the speeds of traffic or its distribution across the road under the two conditions.

There are no figures to illustrate this point at present, but there is no doubt that speed is markedly affected by the evenness of the road surface. It is quite clear that the modern machine-laid bituminous surfaces, usually laid by machines, do encourage higher speeds. It is likely that traffic engineers will have to do more to discourage high speeds on the roads in future.

The Effect of Traffic Signs

One road condition which affects road user behaviour is the nature of the traffic signs used and it is important for traffic engineers to know the effects these signs have. Investigations on the subject have been made in a number of countries and a few of them will now be described. At least two conclusions can be drawn from these examples. Firstly, that the instructions on these signs are not always obeyed, and secondly, the proportion of road users obeying the indications given by the sign can often be increased by increasing the conspicuity of the signs.

First, as regards Great Britain, the Road Research Laboratory made an investigation on the behaviour of motorists when leaving a minor road to enter a major one. Speed observations and counts of vehicles stopping were made at 42 intersections, 14 of which were controlled by "Halt" signs, 14 had "Slow" signs, and 14 had no signs at all, so these were consequently uncontrolled.

In Great Britain, the "Halt" sign is a mandatory sign and the police can prosecute drivers who do not stop at junctions with such a sign. The "Slow" sign, however, is merely a warning sign and the police have no powers to enforce it.

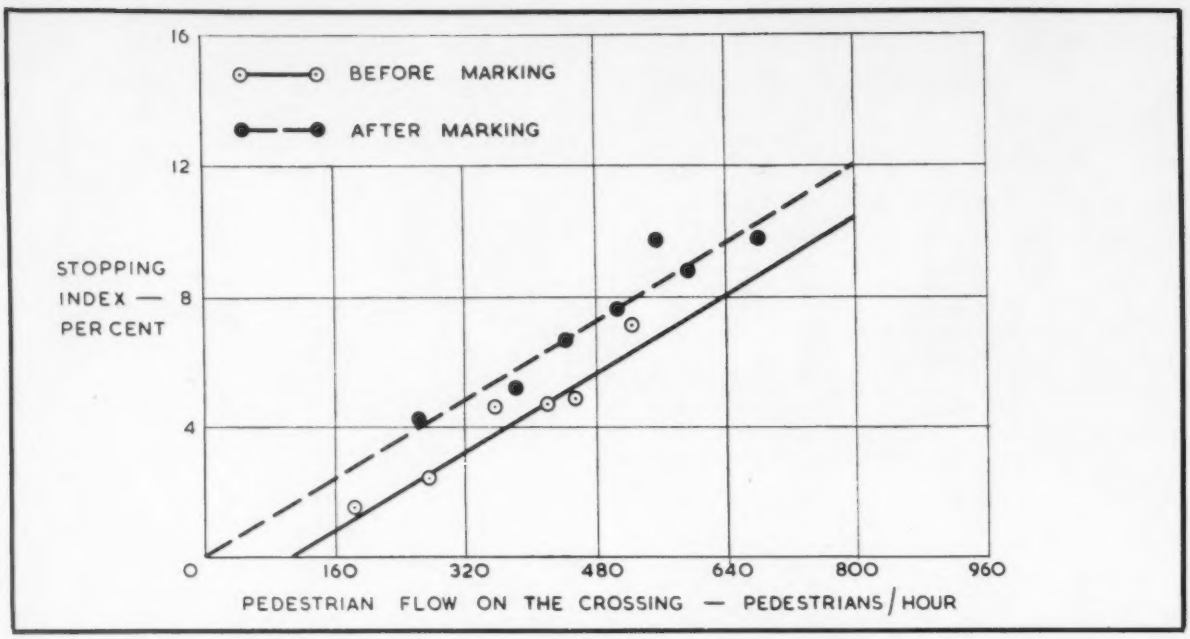

Fig. 6

The results of the speed measurements are as follows. The times at which vehicles passed three points, one 150 feet from the intersection, one 50 feet from the intersection and the other just before the intersection, were noted. The average speed in the sections between 150 ft. and 50 ft. from the intersection and also in the last 50 ft. are given in Fig. 4. It will be seen that the average speeds in the section between 150 and 50 ft. were about the same for all three classes of intersection, but that on the last 50 ft. speeds were lower when there was a "Halt" sign and that a "Slow" sign did not have a large effect on any rate at the lower traffic volumes.

The proportion of vehicles which actually stopped before entering the major road are given in Fig. 5. In this figure the percentage of drivers who stopped at the major road when entering it from a side road is plotted against the volume of traffic on the major road. It will be seen that the "Halt" sign does some good although it is not universally respected. There is no evidence that the "Slow" sign caused people to stop at the major road, although, of course, it should be realized that there is no legal obligation for them to do so. It will also be seen that motorists' behaviour in this matter is very greatly affected by the volume of traffic on the main road.

The Effect of Marking Traffic Lanes

Another series of observations showing the effect on road user behaviour of making traffic signs more conspicuous has been reported by Kipp and van Gils[1] in Holland. They marked some traffic lanes with reflectorized paint instead of ordinary paint. (Reflectorized paint contains small glass spheres which reflect the light from a driver's headlamps back towards the driver's eyes.) The investigators found that the substitution of reflectorized for ordinary paint had little effect during the daylight hours but that a greater proportion of drivers kept to the proper traffic lane during the hours of darkness.

A similar result was found by the Road Research Laboratory in Great Britain where the use of "catseye" studs on driver behaviour was studied. Measurements of speeds and transverse positions of vehicles before and after catseye studs were put down showed that the catseye studs had two marked effects, (1) it caused drivers to keep better to their own lanes and (2) it caused an increase in the average speed of traffic. Speeds of commercial vehicles rose by about 8 per cent, and those of private traffic by 18 per cent.

The Effect of Zebra Crossings

In Great Britain pedestrian crossings are now marked by longitudinal stripes on the road surface. It may be of interest to describe first some of the experiments leading up to the decision to use these markings. Experiments were first made with the object of finding the most conspicuous surface marking and these showed that stripes, parallel to the road surface, were more conspicuous to drivers and pedal cyclists than any other form of marking. A crossing was then selected and counts made of the proportion of motorists who gave way to pedestrians. This crossing was then striped and counts were made again.

The results are given in Fig. 6, in which the proportion of motorists stopping and giving way to pedestrians is plotted against the number of pedestrians crossing the road every quarter of an hour. It will be seen that there was a marked improvement in behaviour at the striped crossing. This experiment was repeated at 30 other crossings and similar results were obtained on every occasion. This showed conclusively, therefore, that making pedestrian crossings more conspicuous results in a marked improvement in road user behaviour. There is not enough space to give data, but it can be said that the increased visibility of the crossings also caused an increase in the number of pedestrians who used the crossing.

[1] J. W. KIPP and J. F. L. VAN GILS: "Traffic Safety with Prismo Paint". *Wegen*, 1949 23 (1), 13-6. *Pub. Works N. Y.*, 1949, 80 (4), 72.

Fig. 7

Fig. 8

Recently an investigation was made on the effect of putting down a crossing at a place where there had not been one hitherto. Fig. 7 shows a typical scene before the crossing was put down, with pedestrians walking across the road anywhere. Fig. 8 shows the same stretch of road with the crossing, and it will be seen that pedestrian movement was much better canalised. Whereas 8 percent of the pedestrians crossed the road at this site of the crossing before the crossing was laid, 52 percent did so afterwards. Pedestrian crossings quite definitely have had a marked effect on road user behaviour in Great Britain.

Conclusion

Some useful but tentative conclusions on road user behaviour can be drawn from the investigations just described. Some of them may be thought obvious but in all cases a quantitative basis is given.

(1) If you want pedestrians to use a traffic facility you must make it easy for them to do so.

(2) Pedestrians are, sub-consciously, quite good judges of vehicle speeds but the average and cautious pedestrian tends to under-estimate the higher speeds.

(3) Motorists drive more carefully on roads that look slippery, but not carefully enough. There are more accidents under such conditions.

(4) The instructions given on traffic signs are not always obeyed. The proportion of road users obeying these instructions can often, however, be increased by making the signs more conspicuous.

It may well be that these conclusions are particular examples of general laws relating to road user behaviour.

Acknowledgement

The work described in this paper was carried out as part of the programme of the Road Research Board of the Department of Scientific and Industrial Research. The paper is published by permission of the Director of Road Research.

A NEW TECHNIQUE FOR PROGRESSIVE TIMING OF TRAFFIC SIGNALS

(Continued from page 360)

dard stop watches end with 30 minutes, so it is obvious he will not be able to complete the next signal before he runs out of both. In the present case, since 30, 40, 45 and 50 second cycles repeat themselves every thirty minutes, he can go back to the top of the table and allow his stop watch to run.

On cycles other than these four, however, the cycle does not repeat every 30 minutes and it becomes necessary to reset the watch. This is done by using "factor a" in the tables, which is supplied for this purpose. "Factor a" is the cycle time less the offset, and appears at the head of each column.

Assume the maintainer had, for whatever reason, stopped his watch after finishing at Berkley Street. To restore it to system time he proceeds as follows. When the signal turns green for Greene Street, at Berkley, he restarts the watch. Referring to the data sheet (marked "D" on Figure 5) he finds the offset of Berkley Street is 15 seconds. Turning to the proper table (Figure 3), "factor a" for offset 15 is given as 35. He then waits until his watch reaches 35 sec., and immediately stops, resets, and restarts his watch in quick succession. The watch is now again on system time, and the

℘ Offset	0 or 1	1 or 2
Sec. Offset	0	1
	MIN SEC	MIN SEC
Factor a	0 00	0 49
	0 00	0 01
	0 50	0 51
	1 40	1 41
	2 30	2 31
	3 20	3 21
	4 10	4 11
	5 00	5 01
	5 50	5 51
	6 40	6 41

Fig. 7

Portion of Table 5 — Sheet 1, showing part of the 0-second offset column for a 50-second cycle.

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next start of green on Greene Street will occur when the watch reads the first interval in the table—15 seconds.

In this manner he can restart his watch from any signal in the system which has already been set, and need not return to the system master. It should be pointed out, however, that each time this is done, the possibility of adding cumulative error creeps in, and it is better to return occasionally to the system master to avoid the building up of such error.

When the maintainer reaches Washington Lane, he might set the signal on that street in exactly the same manner, and then continue south on Greene Street from Washington Lane to his starting point, Chelten Avenue. When he reaches Chelten Avenue, the loop *must* close, for his watch is still timed from this point, and there has been no chance for cumulative error to have thrown his work out.

Using the sheets for Chew Avenue, Germantown Avenue, Lincoln Drive and Upsal Street in exactly the same fashion, he can set in the remaining signals in the grid.

Where two streets having progression cross, the data sheets for both streets show the intersection, and the appropriate offset is shown on each sheet. Thus the maintainer can check such an intersection from either street without performing any calculations. Care must be taken, of course, that if the split is changed, one of the offsets must also be changed.

Stop watches employed with this method must be of standard commercial accuracy for jeweled watches. As such they should not vary more than one second per hour. Such accuracy is adequate, for power systems will deviate from standard time by this much in an hour also, and the maintainer should check back against the master approximately every hour.

The Germantown area shown in Figure 2 was the section of Philadelphia in which this technique was first used. This section covers approximately ten square miles and has a population of about 100,000. It includes a major shopping area which attracts many people from outside the area and has many local shopping areas. In addition, its streets carry a good deal of through traffic having both origin and destination outside the section. Seventy-five traffic signals are in operation in the section, which were coordinated prior to the Fall of 1952. The coordination of sixty-two of these signals into both north-south and east-west progressions by this method was so successful that the method has been adopted citywide, and is now applied to the coordination of several hundred signals in the City of Philadelphia.

Yearbook Changes

BARRY, Donald W. (Associate)
Traffic Engineer, City of Fort Wayne. SEND MAIL: R.R. No. 13 Windsor Road, Fort Wayne, Indiana.

BATES, Russell G. (Associate)
Parsons, Brinckerhoff, Hall & MacDonald, Suite 1608, 311 W. Ashley Street, Jacksonville 2, Florida.

CAMPBELL, Basel C. (Associate)
Traffic Engineer, Transport Department, P. O. Box 6107, Te Aro, Wellington, New Zealand.

CONNER, Robert E. (Junior)
Traffic Engineer, Tippetts-Abbett-McCarthy-Stratton, New York 36, N. Y. SEND MAIL: 181-R Howard Drive, Bergenfield, New Jersey.

DODGE, Eric D. (Junior)
Transportation Economist, Tippetts-Abbett-McCarthy-Stratton, New York 36, N. Y. SEND MAIL: Campbell Avenue, Suffern, New York.

FRATAR, Thomas J. (Member)
Associate Engineer, Tippetts-Abbett-McCarthy-Stratton, 62 West 47th Street, New York 36, New York.

GARDNER, Lamar W. (Member)
Senior Traffic Engineer, Department of Traffic, 1000 City Hall, Los Angeles 12, California.

(Continued on page 386)

For MODERN

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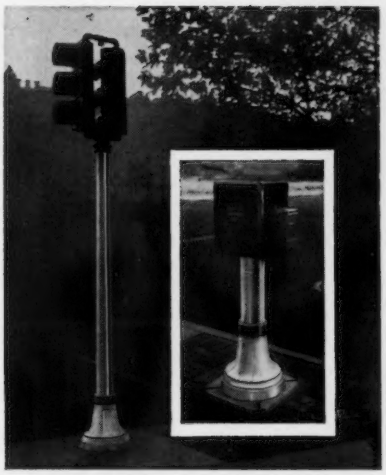

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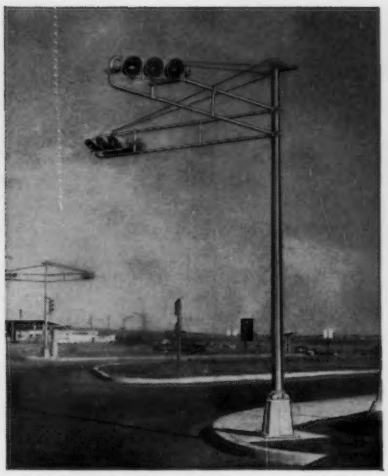

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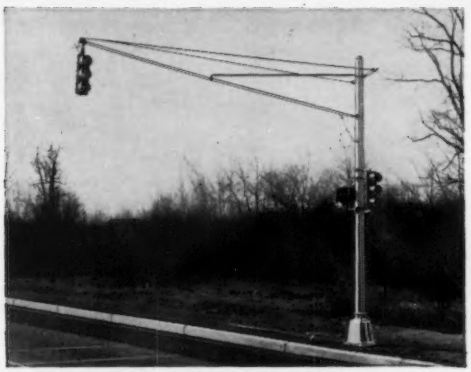

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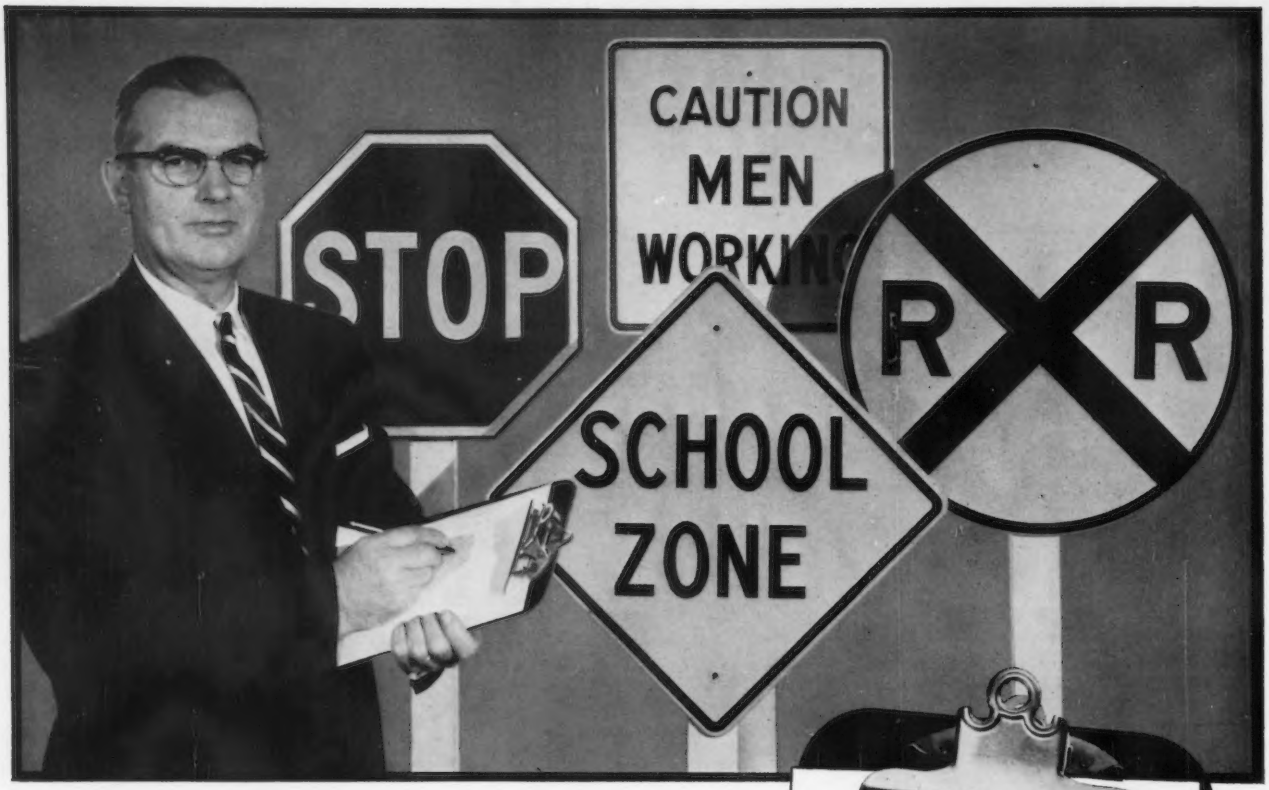

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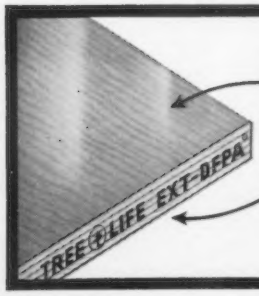

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TRAFFIC NEWS

New Chair of Traffic Engineering Established in Australia

Prime Minister Menzies announced in Canberra in April that a Chair of Traffic Engineering will be established shortly at the New South Wales University of Technology. The Chair has been endowed by the Australian Automobile Association, which has made available a sum of £25,000 to be expended over a period of five years. Mr. Menzies said that the Chair would be the first of its kind in Australia. It would fill a long felt need for specialized training in this comparatively new and very important science.

A post-graduate course of study, probably of one year's duration, would be given and it was expected that students would come from New Zealand as well as Australia. Mr. Menzies added that although the cost of the Chair had been met, a large proportion of the engineers who should take the course would need some financial aid to enable them to do so. He hoped, therefore, that others would follow the lead given by the Australian Automobile Association and make scholarships available.

Commenting on this statement, Professor J. P. Baxter, Vice-Chancellor of the N.S.W. University of Technology, said that he was delighted with the Prime Minister's announcement. The University had already made preliminary investigations and would soon be in a position to announce its plans. Professor Baxter added that experienced men in this field were difficult to obtain, and the University would make a thorough investigation of the position overseas, particularly in the United States of America, before making an appointment.

CHAIR OF HIGHWAY ENGINEERING

Simultaneously, the Premier of New South Wales, Mr. J. J. Cahill, announced that a Chair of Highway Engineering would be established at the N.S.W. University of Technology.

He said that the Chair would be financed by the State Department of Main Roads, which would contribute £5,000 per annum for five years. It

(Continued on page 370)

CRANDALL NAMED WINNER
F. Bruce Crandall, Oregon state traffic engineer, accepts check for $100.00 from Myles W. Smith, Association of Casualty and Surety Companies, sponsor of the annual "Getting Results" award.

Crandall Named Winner "Getting Results" Award

A well conceived, but simple and inexpensive method of channelizing automobile traffic at an irregular four-street intersection in Oregon City, Oregon, won the top award in the 1954 "Getting Results Through Traffic Engineering" competition for F. Bruce Crandall (Mem., ITE), Traffic Engineer of the Oregon State Highway Department. The award winning case study is shown below.

Mr. Crandall's solution to the traffic problem was the construction, at a cost of only $175, of a long, curved concrete "jiggle bar" on one of the streets approaching the intersection. This island forced motorists to follow a course which gave them better visibility of all traffic at the intersection, and precluded "shortcutting" lefthand turns that obstructed traffic going in the opposite direction. The plan is credited with reducing accidents 47% during a seventeen-month period after it became effective, as compared to a similar period previously.

The award, a check for $100.00, was presented to Mr. Crandall at a special testimonial luncheon given by the Oregon Association of Insurance Agents in his honor. The presentation was made by Myles W. Smith, Public Relations Associate with the Pacific Coast office of the Association of Casualty and Surety Companies, sponsors of the nationwide competition.

During the last 16 years, 124 case histories, describing successful application of traffic engineering techniques, have been published in the "Getting Results" series. This annual award, first given in 1950, was established to promote greater safety throughout America by demonstrating the positive value of good engineering practices in reducing traffic accidents and congestion. Previous winners were Edgar F. Copell, J. Edward Johnston, Henry A. Barnes, Fred T. Fowler and Harry Howard, Jr.

Mr. Crandall's entry was selected from among the five case histories published in 1954 by a board of judges con-

CHANNELIZATION WITH JIGGLE BARS REDUCES ACCIDENTS 46 PERCENT

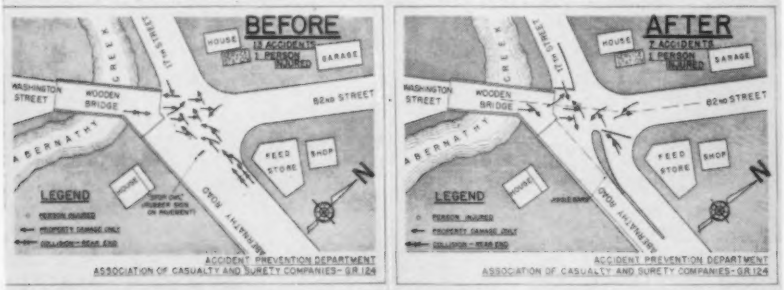
Case Study No. 124

PROBLEM: At the irregular intersection of four streets in Oregon City, Oregon several accidents had occurred, with the majority involving northbound and westbound vehicles. A bridge structure on the south approach to the intersection restricted sight distance for vehicles on Abernethy Road and Washington Street. Furthermore, drivers on Abernethy Road, intending to make a left turn southbound, often "cut the corner" toward the bridge.

FACTS: Each of the four streets is a two-lane bituminous pavement with variations in horizontal alignment and practically level grades. Trees and shrubs in the southeast and southwest quadrants, not on highway right-of-ways, contribute also to restricted sight distance for vehicles approaching from the east, west and south. Buildings limit sight distance in the northeast and northwest quadrants. Average speed of north-south traffic ranges between 25-35 miles per hour. Computed 24-hour volumes (expanded from 16-hour counts) indicated movements by approaching vehicles as follows:

Street	Total Vehicles Entering	Turned Left	Turned Right	Straight Through
Abernethy	1308	1024	93	191
Washington	2967	36	1027	1904
17th Street	204	51	110	43
82nd Street	2300	123	54	2123

Vehicles entering from Abernethy Road comprised 19 percent of the total volume, although reports showed them involved in 52 percent of all accidents over a 58 month period. In 17 months immediately preceding improvements, 13 accidents occurred, including 6 collisions between northbound and westbound vehicles, causing extensive property damage and one personal injury.



SOLUTION: Requests for a traffic signal were denied on the basis of existing conditions not meeting minimum warrants. With the sight distance limitation a major factor in most of the accidents it was decided to channelize the Abernethy Road approach using concrete jiggle bars. By keeping westbound drivers further from the end of the bridge their sight distance to the south has been greatly improved.

CHECKBACK: In a comparable 17-month period following construction of the channelizing island, there has been a total of 7 accidents including one injury, representing an accident reduction of 46 percent.

COST: Estimated cost of the improvement was $175.00.

Prepared by:
Accident Prevention Department
Association of Casualty and Surety Companies

Contributed by:
F. BRUCE CRANDALL
Traffic Engineer
Oregon State Highway Department
Salem, Oregon

Award Winning Case Study

sisting of representatives of each of the following organizations: American Association of State Highway Officials, International Association of Chiefs of Police, National Safety Council, Yale Bureau of Highway Traffic and Institute of Traffic Engineers.

NEW CHAIR OF TRAFFIC ENGINEERING ESTABLISHED IN AUSTRALIA

(Continued from page 369)

would be complementary to the Chair of Traffic Engineering endowed by the Australian Automobile Association.

The establishment of the Chairs would be of considerable advantage, not only to New South Wales, but to all States in the Commonwealth.

It was essential, added Mr. Cahill, that the N.S.W. roads system should be raised to a higher standard, particularly in country areas.

Establishment of the Chairs was an important step towards providing proper facilities for the study of problems and training of engineers in the two fields.

The A.A.A. offers its congratulations and thanks to Mr. Cahill and to the N.S.W. Department of Main Roads for their generous contribution towards better roads.

The next step, and one which must be taken without delay, is the provision of more funds from existing taxation on motorists to finance a properly integrated national roads program. The present wholesale diversion of these funds must be stopped.

Traffic Engineering and Road Safety

The Thirteenth Congress of the Australian Road Safety Council, which is to be held in Perth from September 26th to 30th, 1955, will have as its theme *"Traffic Engineering."*

This is particularly appropriate, in view of the decision to establish an A.A.A. Chair of Traffic Engineering at the N.S.W. University of Technology.

"The Three 'E's' "—Education, Engineering and Enforcement—are the cardinal points in the Road Safety campaign. Not the least of these is Traffic Engineering, which will build safety into our roads system.

From the AAA Federal News Letter
Sidney, Australia

Engineers Face Threat of Unionism

"Trade unions have evidently embarked on a planned campaign to unionize the professional engineers of America," it was declared recently by Clarence T. Shoch, President of the National Society of Professional Engineers.

Speaking before a Conference of Presidents of state organizations, representing 39 member state groups of the National Society, meeting at Champaign, Illinois, Shoch said that high-level official spokesmen of the two giant labor federations have made it clear that they regard professional engineers as part of the labor force.

The engineering society President told the state officials that the March, 1955 issue of *The American Federationist,* official publication of the American Federation of Labor, contained an article by A. F. of L. President George Meany, "Engineers Need Unionism," in which the labor leader criticized the professional engineering societies for injecting themselves into the field of labor-management relations.

He also cited a recent speech by James B. Carey, Secretary-Treasurer, CIO, and President, International Union of Electrical, Radio and Machine Workers, CIO, before engineering students of an eastern college in which an appeal was made for engineers to consider joining the CIO union or other trade unions.

Shoch stated, "Mr. Meany told his readers that 'more and more engineers are turning for assistance to the recognized union composed exclusively of men and women working for wages and salaries in the engineering profession'. Mr. Carey hailed the responsibility of action and cooperation between a local of his union and an engineers' union in a recent strike as 'a new high-water mark in the trend toward collective action by professional engineers'. These expressions prove "what we have long contended—that there is no half-way mark in the unionization of the engineering profession. We will either maintain our professional standing as individuals, working through our engineering societies and associations, or we will go all the way down the path of unionism.

"It seems clear that the professional

engineers of this country are going to face a barrage of propaganda from the trade unions in view of the attention given our profession by such high-ranking labor leaders," Shoch said. He cautioned the heads of the state engineering groups meeting at the annual State Presidents' Conference, "This effort of the labor group to unionize our profession bodes no good for the engineers of this nation, because of its deteriorating effect on their creative initiative."

Shoch added that the recently-announced merger of the AFofL and CIO, plus the current interest of the leaders of the two groups, could mean an all-out effort to bring professional engineers into existing trade unions.

The engineering society President told the group that despite denials that the existing professional societies could not serve the economic and social interests of professional engineers, a comprehensive study and report by the Society's Engineer-in-Industry Committee, which has just been published, presents a sound and workable plan to improve the status of professional engineers through cooperative action by the engineers themselves, management and the professional societies. "The program presented in the Committee's work, 'A Professional Look at the Engineer in Industry', is *must* reading for every engineer who has professional consciousness", Shoch said. "It presents the facts regarding unionization efforts, the special provisions applicable to professional employees under the Taft-Hartley Act, economic conditions, professional status in industry, and, particularly, a detailed and specific program to achieve constructive results for the engineers of this country on a professional plane. It also emphasizes that more and more, the ranks of management are being filled by professional engineers."

Shoch told the delegates that the recent developments prove the soundness of the observation in the Committee's report that the proposition that engineers can have "professional" unions is wishful thinking. "Engineers who indulge in 'professional' unionism", Shoch added, "will shortly find themselves in the category of unionized skilled labor, no matter how highly-stated their initial motives might have been.

"We can meet this challenge with resolute determination, or we can dodge the issue and watch the disintegration of a great and noble profession. I have no doubt of our choice. I call upon each of you at this annual State Presidents'

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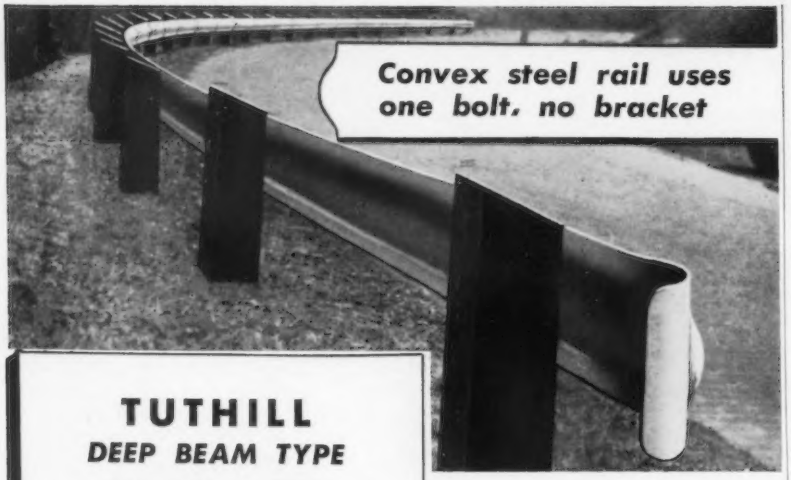

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Moses and Mayors Conference Favor Clay Proposal

Robert Moses, city planner of New York, last month testified before the House Subcommittee on Roads in favor, generally, of H.R. 4260, based on Clay Committee recommendations. As for the Gore bill reported out by the Senate Public Works Committee, Mr. Moses said, "It will not do the job."

Basing his position primarily on what he termed to be a need for immediate, large-scale action to obtain rights-of-way for urban and near-urban sections of the Interstate System, Mr. Moses declared that already "the bell has almost tolled." It is extremely difficult and expensive, and from a practical standpoint sometimes nearly impossible, to pay for and demolish large buildings and relocate great numbers of people, he said.

Mr. Moses stressed that, in his opinion, "we are more than 10 years behind" in meeting highway needs. "I don't believe you can do any real catching up on a 'pay-as-you-go' basis," Mr. Moses said further.

"When large automobile companies and related industries decide to expand," he said, "they borrow. I cannot see the difference between their borrowing for expansion of a plant and the government's borrowing to provide a road system on which vehicles will run."

"Most of the physical improvements contemplated will have a very long life," Mr. Moses added. He saw "no reason why this generation should pay the whole cost" for such improvement.

Of the provision in H.R. 4260 which calls for reimbursement to states which have brought part of their Interstate System up for Federal standards, Mr. Moses commented, "It seems to me controversial, undesirable and unnecessary."

Instead, Mr. Moses said he would like to see the Federal government, "by grants or underwriting make it possible for toll authorities to finance projects that are not wholly self-supporting.

"It is a Santa Claus feature," he said, "but it is a lot better than to make the roads 100 per cent financed by Santa Claus."

Following Mr. Moses, Roy Hofheinz, Mayor of Houston, Texas, appeared before the Subcommittee, representing the Conference of Mayors, also in support of Clay Committee recommendations.

Mayor Hofheinz gave examples of rights-of-way purchases in the Houston vicinity within the last two decades, showing how real estate prices had skyrocketed. Along one expressway, he said, land prices had been $500 an acre, less than twenty years ago. When it was necessary to obtain wider rights-of-way about 12 years later, abutting land had risen to around $15,000 an acre. Now, Mayor Hofheinz declared, further purchases would be approximately $25,000 an acre and, in another 10 years, might well go up another 100 per cent.

Except for the feature of reimbursement, Mayor Hofheinz stated that the Mayors generally favored the Clay Committee recommendations because they would make possible programming and buying rights-of-way now.

New Line Markers

Just introduced by Harris-Barrier, Inc., 916 East 23rd St., Indianapolis, Ind., Space Markers, a solution to a problem that has long plagued parking supervisors; keeping cars in proper stalls and maintenance of yellow lines.

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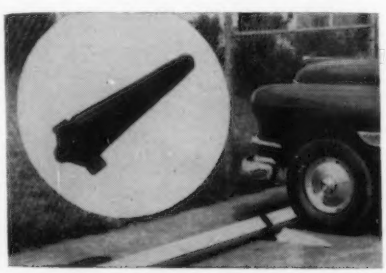

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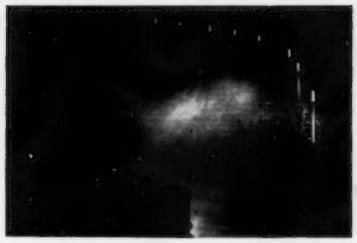

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New Appointments . . .

Johnston Appointed to U. S. Chamber

J. Edward Johnston (Mem., ITE), has resigned as Manager of the Traffic Engineering Department of the American Automobile Association, to accept an appointment as Highway Transportation Specialist for the Chamber of Commerce of the United States.

Mr. Johnston's engineering career began in 1925, immediately after graduation from high school in Lincoln, Nebraska. After two years of field work for the Nebraska State Highway Department, he transferred to the office to work part time and attend the University of Nebraska. During the next twelve years he worked his way up through various posts of increasing responsibility.

J. Edward Johnston

In 1939, Johnston entered the Yale Bureau of Street Traffic Research. Upon completion of this course, he was employed as Traffic Office Engineer and a year later became State Traffic Engineer. The period which followed saw a great variety of traffic engineering activity in Nebraska, the most important of which was a state-wide educational program for the use of uniform warrants in the application of traffic control devices.

During World War II in addition to being Traffic Engineer he was State Zoning Engineer in charge of comprehensive zoning around war plants. Shortly after the Second World War, Mr. Johnston was active in organizing a State Safety Council, and served as its Executive Director for two years as part of his traffic engineering functions.

In 1952, Johnston became Manager of

(Continued on page 376)

Holmes Named BPR Deputy Commissioner

Edward H. Holmes (Assoc. Mem., ITE) was recently appointed Deputy Commissioner in charge of Research of the Bureau of Public Roads, following the retirement of H. S. Fairbank. Formerly Chief of the Highway Transport Research Branch, Mr. Holmes has spent his entire professional career with the Bureau.

Edward H. Holmes

A native of Cape Cod, Massachusetts, Holmes graduated from the Massachusetts Institute of Technology in 1928. After a year of field work with what was then the Public Road Administration, he was given a leave of absence to accept one of the early Erskine Fellowships at the Harvard Bureau for Street Traffic Research. While there he produced, in collaboration with L. S. Tuttle, a treatise on the economics of highway intersections which won professional recognition for the authors and provided an entree to the newly formed Division of Highway Transport at PRA.

Mr. Holmes was among the first to recognize the importance of studying and analyzing the traffic stream as a whole. Under his immediate direction or general guidance have been developed many of the basic elements of traffic flow that are now generally accepted in highway design and traffic operation. Present day traffic counters and other traffic recording equipment, as well as standards of lane capacity, vehicle performance, passing distances and highway alignment are the results of work done by the Highway Transport Branch.

In 1945, Holmes became Chief of the

(Continued on page 376)

Henry Evans Joins Trucking Firm

Henry K. Evans (Mem., ITE), formerly highway transportation specialist with the U. S. Chamber of Commerce, was recently named special assistant to C. G. Zwingle, vice president-operations, of the Pacific Intermountain Express Company in Oakland, California.

At P-I-E, Evans will work with various motor truck associations in the states through which the company operates. This is the first instance of a trucking firm having a highway expert on its staff in order to better participate in national highway development.

Henry K. Evans

"Hank", as he is popularly known, was valedictorian of his high school graduating class in Santa Maria, California. Taking advantage of a scholarship to the California Institute of Technology, he received a B.S. in Engineering from that school in 1938. The following year was spent at the Yale Bureau of Highway Traffic.

Returning to California, Mr. Evans spent two years as traffic engineer for the Automobile Club of Southern California. After several short assignments with the WPA as traffic survey project technician and with the FBI as a special instructor, he spent a year with the National Safety Council.

In 1943 Evans became traffic engineer for the National Conservation Bureau, now known as the Accident Prevention Department of the Association of Casualty and Surety Companies, with the major assignment of helping to prepare the original "Manual of Traffic Engineering Studies". Two years later he became director of the Traffic Engineering

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Division, conducting a number of city and state traffic surveys as well as several research projects connected with accidents and short count traffic studies.

Shortly after being discharged from a short "hitch" with the U. S. Army, Mr. Evans again returned to California as resident engineer for DeLeuw, Cather and Company. He directed the San Francisco transportation planning project involving detailed recommendations for expressways, subways, public transit facilities, parking and accident prevention measures.

At the conclusion of the West Coast project in 1949, Mr. Evans accepted a position as highway transportation specialist with the U. S. Chamber of Commerce, consulting with national organizations and business groups on traffic and highway problems. His activities also included work on national transportation policy and preparation of testimony for Congressional hearings.

Evans jointly authored the book "Traffic Engineering and the Police" with Frank Kreml, and has written many booklets and articles dealing with traffic engineering, survey techniques and highway improvements. He was editor of the current "Traffic Engineering Handbook" and edited the second edition of the "Manual of Traffic Engineering Studies". He was editor of TRAFFIC ENGINEERING magazine for about three years and served a year as editor of the "Traffic Engineer's Reference Notebook".

Mr. Evans has been active in ITE affairs, holding the positions of President of the New York Metropolitan Section in 1947 and President of the Washington, D. C. Section in 1954. He was Secretary of the ITE Technical Council and Research Coordinator for three years and now holds several important ITE

(Continued on page 383)

J. EDWARD JOHNSTON

(Continued from page 375)

first, the Highway Department, and then the Traffic Engineering Department of the AAA and has been with that organization up to the time of his recent appointment. While with the AAA he visited many cities to advise on means of improving their parking and congestion problems. The AAA booklet "Parking Program" was prepared under his direction. He worked closely with AAA Clubs in the development of active traffic engineering programs and represented the Association on a number of national committees.

Mr. Johnston has been active on many committees of organizations such as the American Association of State Highway Officials, Highway Research Board, National Safety Council. He is a member of the American Society of Civil Engineers, and is a registered professional engineer. He has been active in the Institute of Traffic Engineers for many years, serving on the Board of Direction as a Director, as Program Chairman of the Kansas City Technical Sessions and is now Secretary of the Technical Council.

"Ed" spends some of his spare time with his hobbies of golf and photography. However, he and his wife, Ruth, are enthusiastic square dancers and spend many of their evenings and weekends instructing and calling square dances. Their twelve-year-old son, James, is following his Dad's footsteps and already is a pretty competent caller and dancer in his own right.

EDWARD H. HOLMES

(Continued from page 375)

Highway Transport Research Branch. In that role he brought about a new understanding of the complex relationships between the geometric design of streets and highways, traffic control, driver behavior, and the safe, efficient movement of motor vehicles.

Mr. Holmes' work has not been confined to traffic operation. He has been active in the work of the highway planning surveys since their inception in 1935, proving the compatability of highway planning and traffic engineering. From this planning work have come many new survey techniques including the "home interview" surveys and the sampling schedules used in many statewide surveys. In 1950, Mr. Holmes received the Department of Commerce Meritorious Service Award for outstanding service.

As chairman of the National Joint Committee on Uniform Traffic Control Devices, Holmes has directed staff work connected with the development and revision of these standards. He is a member of the Department of Traffic and Operations of the Highway Research Board, and is active in the work of the National Safety Council and many other groups working in the field of traffic and safety.

Popularly known as "Ted", Mr. Holmes has the rather unusual hobby of photographing railroad locomotives, when he is not discussing baseball with his two sons.

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Miscellanea

Downtown Idea Exchange, a monthly newsletter for downtown businessmen, reports that the suburban shopping center developments have not hurt downtown business appreciably. Instead, it is the business of the old neighborhood shopping centers lacking adequate parking which has been most noticeably affected. A recent survey of an old neighborhood shopping center showed that only 46% of the shoppers came by private auto, 32% did not even own a car and the other 22% did not have the use of the family car because the husband used it for work.

Detroit is toying with the idea of building underground transit loading and auto parking facilities under Cadillac Square, across from the old City Hall which will be abandoned by city offices moving to new building in new Civic Center by next summer.

The park and ride idea originated by the Providence, Rhode Island, transit company, is beginning to catch on. The Transit Company arranges with outlying filling stations and other types of parking lots to permit riders to park their cars all day at no charge. The Transit Company benefits by the increased business to and from town and the parking lot owners benefit by increased purchases by the patrons that use their free lots. Richmond, Virginia, is trying the same plan and so have several other cities.

The Downtown Idea Exchange reports that a large department store in Hempstead, Long Island, has set up a shuttle bus service to bring its employees to the store from fringe parking lots. The new system keeps open 30% more parking spaces for customers. Everybody is happy with the new arrangement including the employees.

Toronto will start its 60 million dollar lake shore expressway next summer. It is expected to handle about 150,000 vehicles a day on its central portion. Why don't some of our Canadian ITErs write an article for TRAFFIC ENGINEERING on some of the Canadian projects. We would be happy to have such articles.

Sixty-six merchants of Rotterdam, Holland, have combined forces and built the first shopping center development of its type in Europe in downtown Rotterdam. The new development is based on a "shoppers bill of rights" with no motor traffic being allowed and all walkways being protected from inclement weather by overhead canopies. Three parking lots for 1800 vehicles have been provided and Holland's cycling public is provided ample bicycle racks. The specialty stores face front on an attractive mall and the area is well served by public transit. The grapevine reports that a similar type project is being planned for downtown Buffalo, New York.

The use of women as school crossing guards has been extended into regular traffic police assignments. Twelve cities are now using women in traffic enforcement and report savings of money and improvement in traffic flow. Fresno, California, found that women give out an average of 65 tickets per day against an average 22 for the men. Salt Lake City reports a 28% increase in parking space and 100% rise in revenue since the girls joined the force. Other cities using women as traffic police are St. Louis, Charlotte, North Carolina; Wilmington, North Carolina; Lubbock, Texas; Winston-Salem, North Carolina; Richmond, Virginia; Wichita Falls, Texas; Stockton, California; New Orleans; and Asheville, North Carolina.

In an effort to prove that parking should be banned on one of the important arteries the Capital Transit Company surveyed traffic on a typical day in Washington and found 463 instances of vehicles illegally parked in no parking, no standing zones or double parked. 180 of these instances delayed the passage of streetcars. City officials have ordered a study of all conditions hindering public transit on this street and may order crackdown with no parking bans.

A big parking lot in Long Island has put a traffic control man on a neaby roof top to radio vacancy information to the jockeys. It is claimed that the system greatly speeds up parking.

It is reported that the assessed evaluations in downtown Pittsburgh, which is being rebuilt, rose 13 million dollars in 1954 and a total of $152,000,000 since the redevelopment was begun in 1947.

Citizens Traffic Committee of Richmond, Virginia, is considering reserving a key street exclusively for transit buses in an attempt to unsnarl the bus traffic in the downtown area. A Chamber of Commerce of U. S. study made in towns bypassed by the extension of the Pennsylvania Turnpike shows that bypassing for through traffic actually helped the downtown business men.

A modern $4,000,000 garage for 1200 cars in downtown San Francisco was opened in February.

Clipped from the South African Municipal magazine: "Parking Meters At Last. So parking meters are coming at last to South Africa. Bloemfontein is to call for tenders for the installation of the first meters in the Union and Durban has been asked to consider adopting this system of parking control. The South African Municipal magazine was the first publication in the Union to draw the attention of local authorities to the value of parking meters, properly used, and therefore if will be with more than usual interest that we shall watch developments in Bloemfontein and elsewhere."

Membership Applications

The following applications have been received since the list of applicants published last month.

APPLICATIONS FOR TRANSFER

CHANDLER, Roger Thayer
Traffic Engineer
City of Providence
147 Fountain Street
Providence, Rhode Island
May 9, 1955 for MEMBER grade

FIELDING, Roy H.
Assistant Traffic Engineer
City of Cincinnati
417 Lincoln Park Drive
Cincinnati, Ohio
May 2, 1955 for ASSOCIATE grade

HANSEN, Robert J.
Associate Highway Engineer
Washington Department of Highways
Transportation Building
Olympia, Washington
May 3, 1955 for ASSOCIATE grade

LUTZ, Simon M., Jr.
Chief, Engineering Div. ACS/1
Headquarters, U. S. Air Force
Room 5C 369, The Pentagon
Washington 25, D. C.
May 5, 1955 for MEMBER grade

TITUS, Robert Edmund
Senior Engineer
State Road Commission of West Virginia
1800 Washington Street, E.
Charleston, West Virginia
May 4, 1955 for ASSOCIATE grade

NEW APPLICATIONS

BAKER, Richard Louis
Assistant Highway Engineer
California Division of Highways
120 So. Spring Street
Los Angeles 12, California
April 18, 1955 for JUNIOR grade

BLUMENTHAL, Robert Carleton
Owner, Robert C. Blumenthal Associates
177 Milk Street
Boston 9, Massachusetts
April 27, 1955 for ASSOCIATE grade

CATHER, Donald Warren
Staff Engineer
DeLeuw, Cather & Company
150 North Wacker Drive
Chicago 6, Illinois
May 13, 1955 for ASSOCIATE grade

DABEL, William Joseph
Assistant City Engineer
City of Napa
City Hall
Napa, California
April 27, 1955 for JUNIOR grade

HOLE, Frederick Reginald
Assistant Director of Traffic
Engineering Department
City Hall
Vancouver 10, B. C.
May 4, 1955 for MEMBER grade

KENNEDY, John A.
Director, Traffic & Safety Section
New Mexico State Highway Department
P. O. Box 1641
Santa Fe, New Mexico
April 28, 1955 for MEMBER grade

MELE, Charles N.
Traffic Engineer II
Bureau of Street Traffic & Parking
Room 709, City Hall
Chicago, Illinois
May 5, 1955 for JUNIOR grade

ROSE, Charles Allen
Assistant Traffic Engineer II
Traffic Engineering Department
City of Atlanta
311 City Hall
Atlanta, Georgia
April 27, 1955 for JUNIOR grade

ROY, George Robert
Assistant Highway Planning Engineer
Port of New York Authority
111 Eighth Avenue
New York 11, New York
May 2, 1955 for JUNIOR grade

VUKOVITS, Frank Steven
Assistant City Traffic Engineer
214 N. Main Street, South Bend, Ind.
April 27, 1955 for ASSOCIATE grade

SECTION NEWS

MIDWEST SECTION

Snipped out of **Midwest ITE*MS**, **Dick Walons**, Editor.

Students Tour City

The fellowship of the Midwest Section traffic engineers was praised by a group of eight students who came here from the University of Illinois for an ITE sponsored tour of Chicago on April 21. The students started their tour from Champaign, Illinois, at 6:00 A.M., and upon arriving in Chicago they visited the Chicago Park District, where a field trip was scheduled for the South Outer Drive improvement, a tour of the City Hall traffic engineering offices, Loop traffic signal master control board, and a field trip to Wells and Lincoln to review a new channelization project.

It was noted that a plug commercial about traffic engineering by the guides resulted in two students preparing to look for a traffic engineering position in Chicago.

They also visited the National Safety Council offices, where they received a short technical session on safety on our highways. An observation of the North Outer Drive during the P.M. rush hour changeover climaxed the field trip.

In the evening the students attended a meeting of the Midwest Section of the Institute of Traffic Engineers, where they participated in a debate on mass transit vs. private car operation.

8 Out of 16,000,000

At the last section meeting we were hosts to 8 members of the University of Illinois ITE Student Chapter. We don't know if they were the entire membership, but even if they account for only 50% of the chapter we have cause to be concerned. What strikes us is that in the great Midwest Section area with a population in excess of 16,000,000 only a handful of young men is interested in pursuing traffic engineering as a profession.

Our schools of higher learning do a pretty fair job of turning out doctors, lawyers, economists, political scientists and an assortment of engineers. When nuclear physicists were needed for A and H bombs, they responded promptly to the demand and today our country is ahead of the rest in the field.

Schools offer courses not only because there is a demand for professional services, but also because there is a desire on the part of prospective students to enter the professions. No school can afford to offer courses when there is no interest in them. How many college freshmen or sophomores know what traffic engineering is? Or better yet, how many high school students are aware of our profession?

Attempts to publicize our activities are mostly confined to technical journals and magazines. In these we convince ourselves that traffic engineering is essential to progress and that we are doing right by sticking to it.

Traffic engineering doesn't have much glamor or luster and the rewards are frequently less than adequate. To overcome these handicaps we need to do a terrific job of selling outside of our circle. Any volunteers?

Meet Dan Hanson

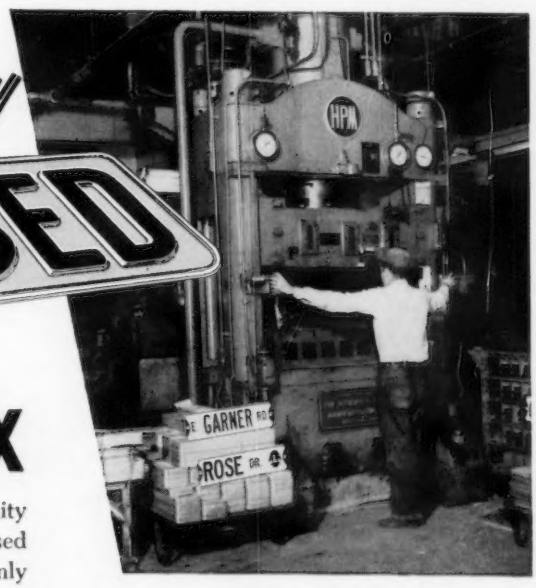
Dan Hanson has had no trouble proving one amazing fact: Establishing a reputation is merely a matter of tackling a big job and doing it well. **Danny** has done this not only with his present position in Peoria, but with each task he encountered on the way up.

Some Midwest ITEs will remember the University of Illinois Traffic Conference of 1951. It was there that **Danny** first caught the eye and captured the attention of Midwest traffic engineers. Then a traffic engineer for the City of Champaign, he explained his problems and how he conquered them in a way that each big city traffic engineer envied. From then on they all knew who **Danny Hanson** was and what he did.

Dan had been at the U. of I. since 1948, received his B.S. degree in 1951, and his M.S. in Civil Engineering in

What it means to Buy

EMBOSSED



SIGNS BY MIRO-FLEX

It means you are making an investment for your community that will last a lifetime. You see, Miro-Flex signs are embossed not less than 0.100 of an inch which means that they not only are stronger, but are more legible than a flat surface sign because of the dimensional effect. Also, Miro-Flex signs are finished with the best baked-on enamel on zinc-coated Bonderized steel to provide maximum durability without maintenance. Be sure to get your free copy of the Miro-Flex catalog on traffic control signs.

WRITE TO
THE MIRO-FLEX CO., INC.
1824 EAST SECOND STREET WICHITA, KANSAS

WHO CAN PREDICT when these fair weather fans will break loose and flood your highways? When these homeward bound hoards deluge your intersections, traffic signal controls must respond and adjust immediately to prevent traffic jams. Heavily burdened highways deserve, and must get more of a share of the green light.

The big difference in traffic controls is that Electro-Matic® automatically proportions the green light to changing demands of traffic. Electro-Matic Traffic-Actuated Controllers *can* give you safe, efficient control of holiday, rush hour, or normal traffic.

TRAFFIC ACTUATED ®

To get proof of this statement, send for free literature — or better still, write and tell us about your traffic signal problems. We will be happy to discuss them with you.

AUTOMATIC SIGNAL
DIVISION
EASTERN INDUSTRIES, INC.
NORWALK • CONNECTICUT

1952. During that time he met his wife, **Mable**, and was married in 1950.

The Chicago Motor Club wooed him away from Champaign in '52, but Danny went back again to speak at the Traffic Conference that year by popular demand. For a while it looked as if the first family addition might come while Daddy lectured, but he made it back to Chicago in time to welcome his new son, **Dukey**.

On December 7, 1953, Peoria had a new traffic engineer, **Dan Hanson**, but **Danny** had a new problem, ulcers. The only part of Peoria he saw during his first eleven days there was out of the hospital window. He was on the job after that, however, despite a diet of baby food and milk for three months.

His record in Peoria is enviable. He can proudly point to a 77% reduction in fatalities during his first year, fewer than ever shown in the City's record books. **Dan** will admit it hasn't been an easy struggle. When he arrived, 42% of Peoria's intersections were plagued by stop signs. To date he has removed 275 of them, with unwarranted signal installations also getting the axe. He's successfully bucked petitions and hearings to do it. His department with 21 employees, is now a separate one, reporting directly to the City Manager.

He still finds time to play golf and bowl, and, as if he hasn't had enough trouble yet, referees basketball and baseball games. We can't quite figure out who would ever want **Danny** as a referee. He has a peculiar habit of making the right decisions and sticking to them. You can't argue with a man like that.

Puzzle Corner

A sign truck was dispatched one afternoon with three sign orders.

At their first stop they put up half a sign more than half of the signs on the truck.

At their second stop they erected half a sign more than half of the signs then remaining on the truck.

At their third stop they put up half a sign more than half of the signs then remaining on the truck.

Then, having no signs at all left on the truck, they returned to the shop. How many signs did they start out with? ? ? ?

LAST MONTH'S ANSWER:

Not too many proved themselves the

equal of this one. Only **Ted Siegel**, **Bob Harris**, and **Dale Humphrey** showed us how it was done. We're hoping for better things this month.

Recently Adopted U. S. Standard Signs
You'll Find in the NEW Lyle Catalog
DO NOT PASS
YIELD RIGHT OF WAY
PASS WITH CARE
SIGN MANUAL
LYLE HAS THEM
For latest signs, for all your signs.
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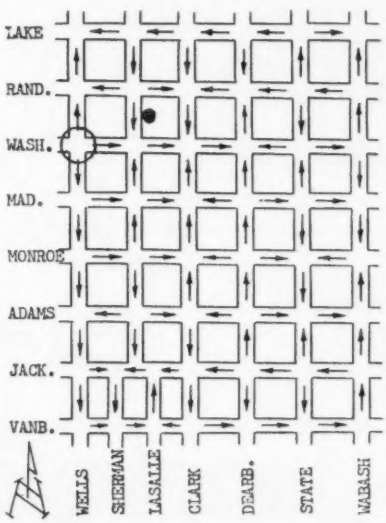
MINNEAPOLIS 14, MINNESOTA

(From April Midwest ITE*ms)

YOU'LL BE AMAZED

Even traffic engineers get zany ideas now and then. We offer this as proof.

Let's just suppose too many Chicago West Side citizens were getting to the



City Hall to register traffic complaints. Then let's suppose that to discourage this nasty practice, the city traffic engineers set up the one-way pattern in the Chicago Loop, as shown below.

How would you, a citizen, go from Washington and Wells (circle) to the LaSalle Street entrance of the City Hall (solid dot), using only the Loop one-way streets as shown?

Discouraging? Definitely, but that's the idea. Possible? Yes, but the route is elusive.

Though it's only make believe, it might be a worthwhile plan to retain. It could make a fine weapon against complaining citizens.

(Answer next month)

Safety Congress

Plans for the next National Safety Congress to be held October 17th to 20th are now being made by **Matt Sielski**, Traffic Chairman.

Those who attended last year are invited to help plan the program by letting **Matt** know what topics would be suitable for "bull sessions" of the Traffic Section. The 1955 meeting is getting off to an early and promising start.

Ogden Signals Ready

Late this month, the City of Chicago is expected to begin operation of a new and different type of traffic signal system along Ogden Avenue. It will incorporate new ideas in the movement of vehicles and pedestrians.

Ogden Avenue has recently been converted into four roadways (two express and two local) by the installation of

median strips. The problem of signalization was made easy when the State approved an experimental overhead installation. Two signal heads will be mounted far side over each roadway, with all turns being controlled by arrows and neon signs informing the motorist of that fact.

Pedestrians, having four roadways to negotiate when crossing Ogden, will also be treated in a new way. A pedestrian crossing Ogden will have a neon signal for each roadway, the four progressively turning to flashing Don't Walk (for clearance) and to Don't Walk, insuring that no pedestrian will be stranded on a median.

Pedestrians crossing any of the cross-streets will be handled on a semi-exclusive basis. They and vehicles turning off of Ogden Avenue will have their own separate intervals, each without conflict from the other.

The five intersections along Ogden involved in this plan (Albany, Kedzie, Homan, Central Park, and Lawndale) already have the "new look". Monotube installations to carry the overhead signals and signs give a revolutionary impression of progress to viewers.

It is expected that the intersections will be under the watchful eye of not only local traffic engineers, but of many others interested in any of the several new phases of the installation.

Chatter

At least one facial tissue salesman in Chicago is on the ball. He got a plug in for his product (Scotties) by donating a box of it to the recent Kleenex-type speed survey on Washington Street.

Since joining our ranks, **Art Dierstein** has been making the trek from Ottawa faithfully for every section meeting. Give that man a gold star.

Neil McCandless, on leave from army post in Germany and currently at Northwestern University, was a guest at the last meeting.

It had to be expected. With king size cigarettes and cokes, what could more naturally follow that a king size ITE yearbook. Next year we might have the only yearbook with a filter tip.

New Mailing List

Following distribution of this issue, ITEMs out-of-section mailing list will undergo a much needed revision. So—

IF you're **not** a Midwest ITE

IF you want to receive or continue receiving ITEMs

Send your name and address to:

Editor, ITEMs
709 City Hall
Chicago 2, Illinois.

WESTERN SECTION

Picked out of "Western ITE"—**Bob Dunn,** Editor-in-Chief.

Wite Life in L. A.

On Wednesday evening, April 20, at the Los Angeles Police Academy, the Los Angeles Area held their fourth and last dinner meeting of the winter season. For the first time, this dinner was open to the ladies and there was a most successful attendance, 75 men and 51 ladies for a total of 126 guests.

Speakers were **John W. Gibbons,** Director of Publications for the Automotive Safety Foundation of Washington, D. C., office. Also, the Honorable Judge **Mrs. Roberta Butzbach** of the Los Cerritos Municipal Court. **Mr. Wm. S. Foulis,** Assistant to the President, and **Mr. D. Grant Mickle,** Director of Traffic Engineering of the Automotive Safety Foundation, were also in attendance.

There was a refreshment hour from 6 to 7 P.M.; dinner from 7 to 8 P.M., and a very enjoyable program from 8 until 9:40 P.M., and those who wished remained to dance until ?

The San Diego Area was well represented at this meeting to promote attendance at the Western Section meeting to be held in San Diego in June.

Every lady present received a lovely corsage from the San Diego group.

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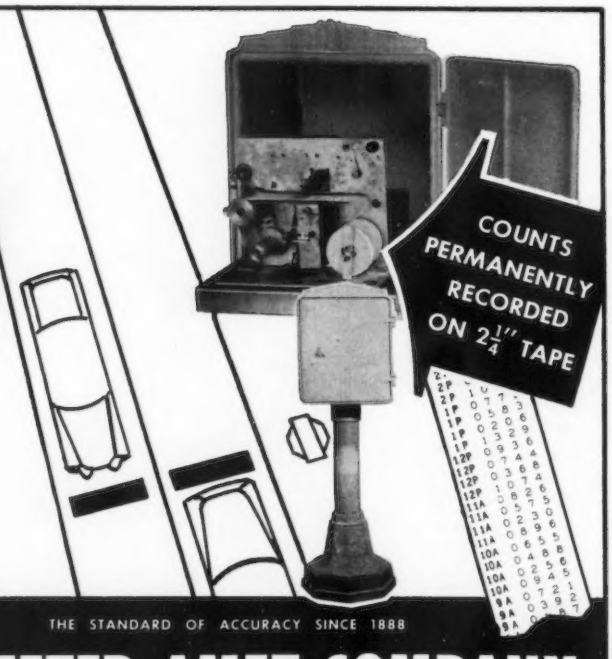
- Rugged permanent year round installation
- Counter can be used with new or existing treadles
- Prints totals each hour and resets to zero
- Count identified with time of day
- Counter housed in rugged weather proof housing
- Will count vehicles traveling in excess of 80 MPH
- Counter capable of 1000 counts per minute
- 115 volt 60 cycle operation
- Power failure indicator optional
- Day of week symbol optional



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Report upon legislative matters affecting traffic and vehicles, now pending at Sacramento, was prepared by **Mr. Harry V. Cheshire** of the Automobile Club of Southern California, and read at the meeting.

Our Vice-President, **Al Hutchison,** and **Mrs. Hutchison** were on hand and both made campaign speeches for the coming election, using the motto "A Vote for Hutch Won't Get you Much."

A party was thrown for the 30th year of **Jack Thoin's** labor for the Los Angeles City Traffic Department. It happened on April 1st on the Tenth Floor of the City Hall. **Jack** is one of the most popular men in the department.

Joe Havenner took his family in the new Buick over to Palm Springs for Easter. The Buick just made the trip as the door fell off again, and it has been in the shop since their return.

Lloyd Braff also made the Easter Migration to Palm Springs. **Lloyd** now has a new home over on the East Side, but no swimming pool as yet.

Hugh Gilman is still trying to regain enough strength for another operation. He has had two tough ones and hopes that the next will be the last one needed.

Frisco Frolics

The members of the ITE in the Bay Area and their friends gathered for a dinner meeting on Thursday, April 28, at 6 P.M., at the Maison Paul Restaurant, 1214 Market Street, San Francisco.

The technical program consisted of a discussion by **Mr. H. D. Quimby** of Parsons, Brinckerhoff, Hall and MacDonald, on the techniques used in the collection of material and the interpretation of results of the O & D surveys for the Bay Area Rapid Transit Study.

Other business at this meeting was the announcement and discussion of tentative committee assignments for the 1956 national convention of ITE by **Mr. Bob Glenn,** Chairman of the Executive Committee.

Jay Czizek and **Bob Graver** have accepted appointments on the Executive Committee for the 1956 national convention. Subject to final approval of the Section Board of Direction, the committee is composed of **Glenn, Shoaf, O'Shea, Czizek** and **Graver.**

Traffic in the Bay Area is currently under study by three nationally-known firms, DeLeuw-Cather, Coverdale and Colpits, and Parsons, Brinckerhoff, Hall & MacDonald.

Jerry O'Shea has a new house. **Dick Wilson** has placed in operation at Vallejo on U. S. Route 40 the first Cycle Computor in the West.

RED MEANS STOP

APPROVED BY THE PUBLIC ROADS ADMINISTRATION

The new Tassco look in stop signs is destined to save many lives and avert accidents on America's streets and highways!

Many states have passed legislation approving this stop sign, and more have amendments pending.

Here is the stop sign that can *only* be interpreted as "Danger! STOP!" Its red color cannot be missed or confused with other signs. Most important, Tassco Red Stop Signs are reflectorized in both colors . . . drivers see the same sign, same shape, same colors both day and night!

THE NEW NATIONAL STANDARD

WRITE FOR FULL INFORMATION ABOUT TASSCO RED STOP SIGNS . . . and for the Tassco Catalog of Traffic and Street Signs in every category.

The Sign of TASSCO Traffic Safety

TRAFFIC and STREET SIGN COMPANY

84 FOUNDRY STREET • NEWARK 5, N. J.

EVANS *(Continued from page 376)*

committee posts. He is a registered professional engineer in both California and the District of Columbia and is a member of various national engineering societies.

Mrs. Evans—Dorothy—met "Hank" through her brother, Henry Osborne, now traffic engineer of Buffalo, N. Y., when the two Henrys were roommates at the Yale Bureau. The Evans household also includes four red-headed boys —Henry, Trent, Reggie and Brad—and a dachshund named Tinkerbell. An amateur radio station occupies much of "Hank's" spare time, and his versatility on the piano is the highlight of many social functions.

Pavement Marking Progress Reported

Recently Dr. Charles R. Waters (Mem., ITE), long time District Engineer for the State Highway Department in the Buffalo District, announced his forthcoming retirement on July 1st. For many years Dr. Waters has represented the American Association of Highway Officials on the Joint Committee on Uniform Traffic Control Devices. He is also a member of the Highway Research Board's Department of Traffic Operations' Roadway Pavement Markings Committee. On May 3, Dr. Waters dispatched a letter to all members of both committees, pointing out the progress toward uniform pavement marking which has been made during the past 15 years. The letter and accompanying map is reproduced in full.—EDITOR.

To Members of:

1. Joint Committee on Uniform Traffic Control Devices for Streets and Highways.
2. Roadway Pavement Marking Committee of the Department of Traffic and Operations of the Highway Research Board.

Sir:

The attached map of the methods followed in marking center lines and "No Passing" areas on two-lane pavements shows that uniformity throughout the United States is within grasp—only three states presently are not conforming to the established standards.

The first survey of marking lanes that was made about 15 years ago showed that out of 48 states there were about 22 different geometric patterns in use at that time. As a result of continued promotion and publicity through the years, we have now reached a point where a recent canvass shows that only three states, namely, Oregon, Missouri and Tennessee, are placing markings which apparently are not in agreement basically with the standards described and recommended by the Federal Manual on Uniform Traffic Control Devices.

Up to this year Texas and Oklahoma have used a solid line for center line and a dash line for the barrier line in "No Passing" zones on two-lane pavements, which was just the opposite of the standard. They are now conforming to the standard pattern. Texas is such a large state, and has such a great mileage of highway, that its decision to adopt the standard is most gratifying.

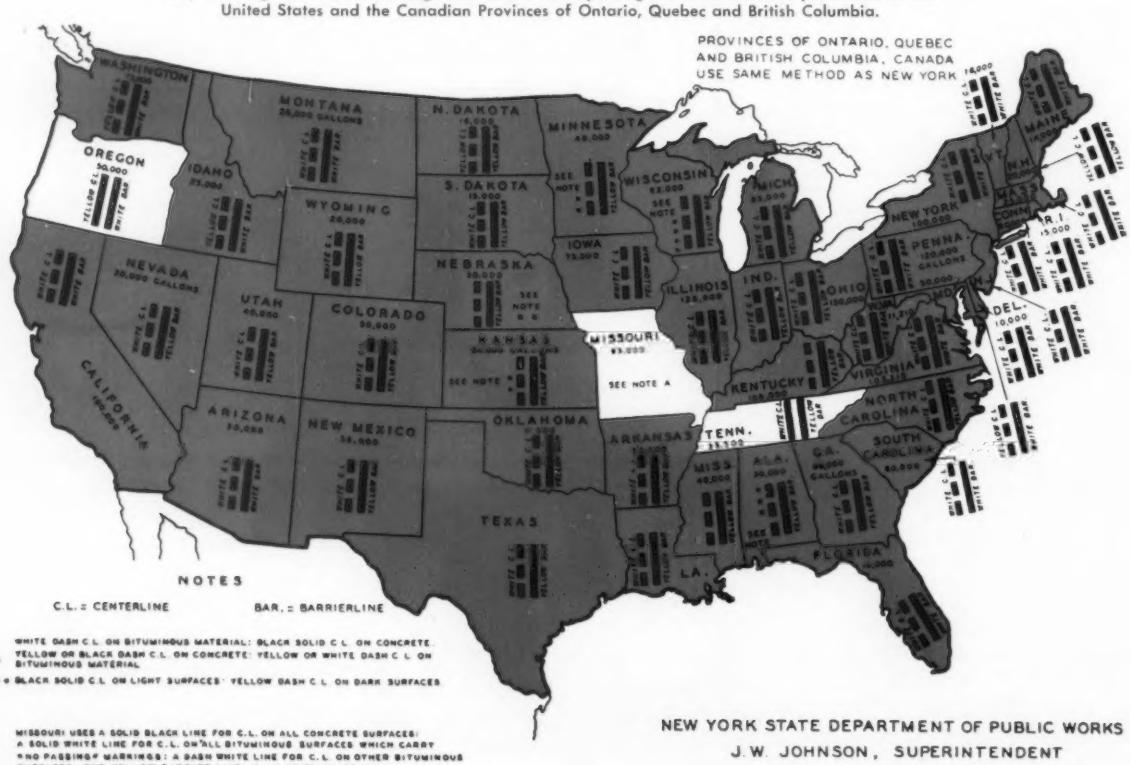
Missouri has been placing the barrier line in the center of the driving lane for several years past but has now modified its method although the State has not as yet gone all the way to meet the standard.

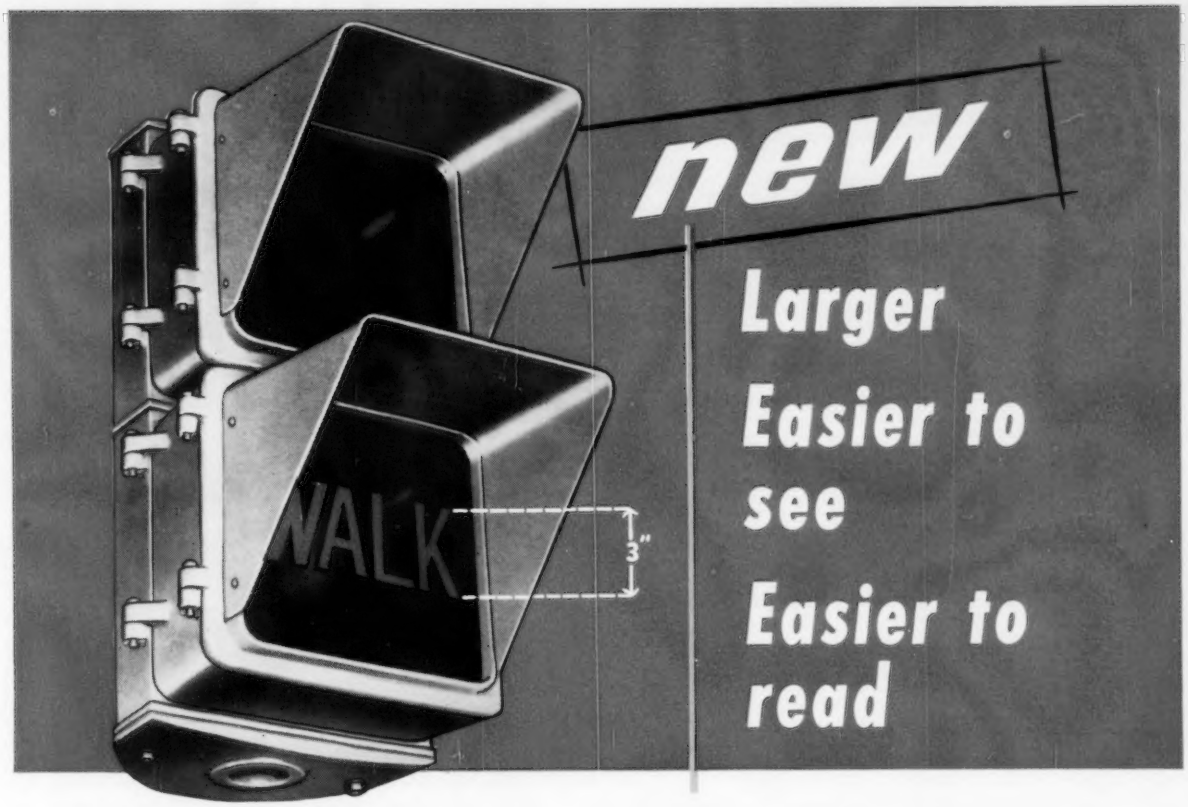
The overall picture is encouraging. In driving from Maine to Florida along the coastal states, or from Maine to California one can expect to encounter the same geometry of pavement lane markings from state to state. It represents a tremendous stride forward in promoting highway safety, and I am pleased to have been a member of National Committees working toward this goal. My term as a representative of the AASHO on the Joint Committee will terminate July 1, 1955.

CHARLES R. WATERS

Buffalo, N. Y.

Map showing methods of marking center line and no passing areas on two lane pavements in the United States and the Canadian Provinces of Ontario, Quebec and British Columbia.

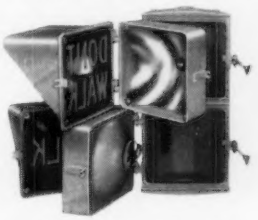

PROVINCES OF ONTARIO, QUEBEC AND BRITISH COLUMBIA, CANADA USE SAME METHOD AS NEW YORK
WASHINGTON
OREGON
CALIFORNIA
IDAHO
NEVADA
MONTANA
WYOMING
UTAH
ARIZONA
COLORADO
NEW MEXICO
N. DAKOTA
S. DAKOTA
NEBRASKA
KANSAS
OKLAHOMA
TEXAS
MINNESOTA
IOWA
MISSOURI
ARKANSAS
LA.
WISCONSIN
ILLINOIS
MICH.
IND.
OHIO
KENTUCKY
TENN.
MISS.
ALA.
GA.
FLORIDA
S. CAROLINA
N. CAROLINA
VIRGINIA
W. VA.
PENNA.
NEW YORK
MAINE
VT.
N.H.
MASS.
CONN.
R.I.
N.J.
DEL.
MD.
SEE NOTE A
NOTES
C.L. = CENTERLINE
BAR. = BARRIERLINE
• • WHITE DASH C.L. ON BITUMINOUS MATERIAL; BLACK SOLID C.L. ON CONCRETE.
• • • YELLOW OR BLACK DASH C.L. ON CONCRETE; YELLOW OR WHITE DASH C.L. ON BITUMINOUS MATERIAL
• • • • BLACK SOLID C.L. ON LIGHT SURFACES; YELLOW DASH C.L. ON DARK SURFACES
A MISSOURI USES A SOLID BLACK LINE FOR C.L. ON ALL CONCRETE SURFACES; A SOLID WHITE LINE FOR C.L. ON ALL BITUMINOUS SURFACES WHICH CARRY "NO PASSING" MARKINGS; A DASH WHITE LINE FOR C.L. ON OTHER BITUMINOUS SURFACES. THE YELLOW BARRIER LINE IS 4" TO RIGHT OF C.L.
GALLONAGE OF PAINT REPORTED USED IS INDICATED UNDER NAME OF STATE.
STATES SHOWN IN COLOR REPORT THEY USE THE GEOMETRIC PATTERN RECOMMENDED IN THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR TWO LANE PAVEMENTS ADOPTED JUNE 24, 1948 P.R.A. WASHINGTON, D.C.
NEW YORK STATE DEPARTMENT OF PUBLIC WORKS
J.W. JOHNSON, SUPERINTENDENT
THIS MAP PREPARED BY
CHARLES R. WATERS, DISTRICT ENGINEER, NEW YORK STATE DEPARTMENT OF PUBLIC WORKS, BUFFALO, N.Y.
MEMBER OF THE COMMITTEE ON ROADWAY PAVEMENT MARKINGS OF THE HIGHWAY RESEARCH BOARD
APRIL 1955



EAGLE PEDESTRIAN SIGNALS

The new Eagle Pedestrian Signal has been designed to increase legibility from greater distances, thereby reducing accidents and saving lives. Featuring letters that are a full 3 inches high! . . . easy to see across a wide street or from any off-angle. In addition, the sharp, square shape of the lens, can readily be distinguished from store signs or traffic lights. Distinctive lens *colors* reduce confusion with neon advertising signs. "Wait" or "don't walk" lenses are furnished in red or Portland orange; "walk" lenses in green or clear white.

Illuminated by a standard traffic signal lamp, the new Eagle Pedestrian Signal operates without transformers. It mounts on standard signal brackets with no special fittings or conduit required. One clear, separate message in each section eliminates complicated circuits. Eagle conversion kits are available for modernizing existing Eagle Signal equipment. Send for free bulletin.



New specially shaped reflector for complete corner-to-corner illumination. Extremities of letters are as bright as the enter area . . . little chance for misreading.

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EAGLE

EAGLE SIGNAL CORPORATION
Municipal Division
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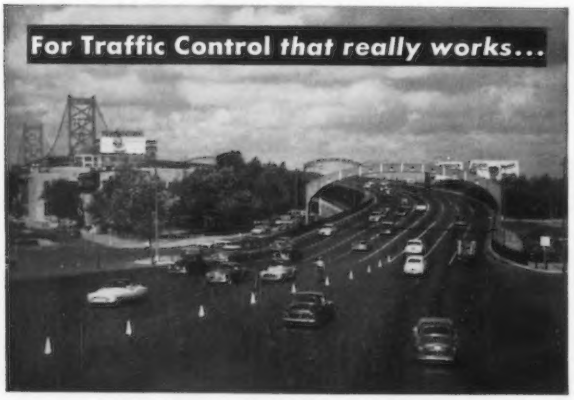
WHITESIDE, Robert E. (Junior)
Associate Traffic Engineer, Wilbur Smith & Associates, 1420 Lady Street, Columbia, South Carolina.



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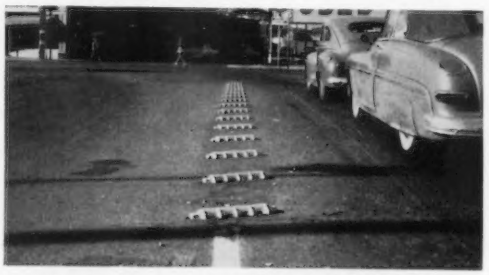

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